

# DANISH REVIEW *of* GAME BIOLOGY

Edited by  
Jagtfondets vildtbiologiske undersøgelser  
and  
Vildtbiologisk station, Kalø

*Managing editors*

R. Spärck  
Zoological Museum  
Copenhagen

H. M. Thamdrup  
Game Research Station  
Kalø pr. Rønde

Vol. 3, Part 3

Copenhagen 1958  
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TRANSACTIONS OF THIRD CONGRESS OF  
THE INTERNATIONAL UNION OF GAME BIOLOGISTS

KNUD PALUDAN

Some Results of Marking Experiments on Pheasants from a Danish Estate (Kalø)

MARIE HAMMER, M. KØIE AND R. SPÄRCK

Investigations on the Food of Partridges, Pheasants and Black Grouse in Denmark

Copenhagen 1958

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THIRD CONGRESS  
OF THE INTERNATIONAL UNION  
OF GAME BIOLOGISTS

*Aarhus 12.-18. October 1957*

TRANSACTIONS



COPENHAGEN 1958

THIRD CONGRESS  
OF THE INTERNATIONAL UNION  
OF GAME BIOLOGISTS

## PREFACE

On behalf of the Danish organizers of the IIIrd Congress of The International Union of Game Biologists I have herewith the pleasure of presenting the transactions of the congress. In doing so I beg all who have cooperated in making this official report possible to receive our most sincere thanks.

We are grateful that all members giving lectures at the congress fulfilled our wishes in sending us before the meeting summaries which were not only very useful during the congress itself, but also—as already announced in connection with the invitations—were to be incorporated in the official transactions of the congress together with discussions etc.

Our young organization has shown rapid development. Since, at the initiative of Professor F. Nüsslein, a modest but promising start was made in Düsseldorf in 1954, a joint meeting with Ö.A.F.W. has been held in Graz in 1955. Next followed this last congress in Aarhus in 1957 while Holland has invited us for our next meeting.

It is, therefore, permissible to say that our Union has proved to possess vitality and also that it has demonstrated its ability to stand on own feet. There can be no doubt that its future growth and development will depend very much on its independence and its innate activity.

In this connection it will be of great importance for our Union if future congresses will become enabled to publish the official Proceedings as a self-contained report containing all contributions and discussions in their entirety and admitting papers in all principal languages. Publications of this kind will emphasize the international character of our meetings and also act as a means of fertile contact between all groups engaged in research on our problems.

If—in spite of its imperfections—the present report can prepare the ground for such self-contained Congress Reports one of its goals has been reached.

*H. M. Thamdrup*

PRESIDIUM

Honorary President:

*P. Stahlschmidt*, Permanent Under-Secretary of State for Agriculture, Copenhagen.

President:

*H. M. Thamdrup*, Director, Dr., Naturhistorisk Museum, Aarhus.

Deputy Presidents:

*A. Bubenik*, Dr., Akademie der Landwirtschaftlichen Wissenschaften, Praha, Czechoslovakia.

*C. L. Coles*, Deputy Manager. I.C.I. Game Research Station, Fordingbridge, England.

*F. Nüsslein*, Professor, Institut für Jagdkunde der Universität Göttingen, Deutschland.

Union representatives

Austria:

*Rudolf Amon*, Graz.

Czechoslovakia:

*A. Bubenik*, Praha.

Denmark:

*H. M. Thamdrup*, Aarhus.

Finland:

*L. Siivonen*, Helsinki.

France:

*Guy Pringalle*, Paris.

Germany:

D.B.R.: *F. Nüsslein*, Hann.-Münden.

D.D.R.: *H. Gäbler*, Eberswalde.

Norway:

*Yngvar Hagen*, Oslo.

Sweden:

*Viltforskningsrådet*, Stockholm.

United Kingdom:

*C. L. Coles*, Fordingbridge.

Yugoslavia:

*Stane Valentincic*, Ljubljana.

Secretaries:

*Johs. Andersen*, cand. mag.      *K. Paludan*, Dr. phil.,  
Danish Game Research Station, Kalø.



## CONGRESS MEMBERS

(Alphabetically arranged)

- Amon, Rudolf*, Kustos, Dr., Graz I, Ballhausgasse 9, Österreich.  
Wiederaufkommen des Grossraubwildes.
- Andersen, Johs.*, cand. mag., Vildtbiologisk Station, Kalø, Rønde, Danmark.  
Hare and deer. Population dynamics.
- Behnke, Hans*, Geschäftsführer des Jagdverbandes Schleswig-Holstein, Wolmersdorf a/Meldorf, D.B.R.
- Blank, T. H.*, Biologist, I. C. I. Game Research Station, Fordingbridge, Hampshire, England.
- Borg, Karl*, Dr. med. vet., Statens veterinärmedicinska Anstalt, Stockholm 50, Sverige.  
Pathology.
- Brooks, Allan C.*, Biologist, Game and Fisheries Dept., P. O. Box 12, Masindi, Uganda, East Africa.
- Brüll, Heinz*, Dr. phil., Schleswig-Holsteinische Forschungsstation Wild, Wald und Flur, Weissenhaus,  
Post Lütjenburg/Holst., D.B.R.  
Äsung und Feinde des Niederwildes unter landschaftbiologischer Sicht.
- Cameron, J. D.*, District Forest Officer, Coleford, Gloucestershire, England.
- Christoffersen, Finn*, Mr., Vildtbiologisk Station, Kalø, Rønde, Danmark.
- Coles, C. L.*, Deputy Director, I. C. I. Game Research Station, Fordingbridge, Hampshire, England.  
Game birds.
- Darling, F. F.*, Dr., Shefford Woodlands House, Newbury, Berks., England.
- Evers, G. Harvey*, Mr., Gaybird Pheasant Farm, Great Missenden, Bucks., England.
- Eygenraam, J. A.*, Mr., Institute for Biological Field Research, Kemperbergerweg 11, Arnhem,  
Holland.  
Repellents, Waterfowl, Roedeer census, Partridges, Pheasants and Grouse.
- Frank, Harry*, Dr., Bonn, Koblenzer Str. 150, D.B.R.  
Niederwildhege.
- Fremery, R. F. de*, Mr., Flatgebouw »Beethoven«, Willem Kesstraat 3, Amsterdam Z, Holland.
- Grenquist, Pekka*, Mr., Munkmästatten 2 B 36, Helsinki, Finland.  
International co-operation concerning wildfowl.
- Gäbler, Hellmuth*, Prof., Dr. phil. habil., Eberswalde, Goethestr. 6, D.D.R.
- Hagen, Yngvar*, dr. phil., Zool. Museum, Sarsgate 1, Oslo, Norge.
- Haltenorth, Theodor*, Dr. phil., Konservator, München 19, Ebenauer Str. 2b, D.B.R.
- Hardenberg, J. D. F.*, Dr., 215 Bezuidenhoutseweg, The Hague, Holland.
- Helminen, Matti*, M. sc., Unionink. 45 B 42, Helsinki, Finland.  
Nutrition and parasites.
- Hewitt, R. M.*, District Forest Officer, Poolway House, Coleford, Gloucestershire, England.
- Iwanowski, Kazimierz*, Forest Engineer, Director of Hunting Department in the Ministry of Forestry.  
Warszawa, Warsaw, Sulkiewicza No. 5 m 5, Poland.
- Jaczewski, Zbigniew*, Dr. vet. med., Warszawa, Grochowska 272, Poland.  
Vergleichende Physiologie der Jagdtiere.
- Jáksić, B. L.*, Prof., Dr., Beograd, Kataniceva 11, Jugoslavija.
- Jensen, Poul Valentin*, cand. mag., Zoologisk Museum, København K, Danmark.  
Biology of mammals.
- Katzenmeier, Philipp*, Oberregierungsrat, Freiburg i Br., Sonnhalde 79, D.B.R.

- Konopka, A.*, Baron, 53 Green Str., London W. 1, England.
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- Linke, Wilhelm*, Oberassistent im Inst. f. allg. Biologie der Humboldt-Universität, Berlin Pankow Masurenstr. 1. D.D.R.
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Deer.
- Lund, Hj. M.-K.*, cand. real., Zool. Museum, Sarsgate 1, Oslo, Norge.
- Matthews, G. V. T.*, Dr., The Wildfowl Trust, Slimbridge, Glos., England.  
Population. Migration. Management.
- Müller-Using, Delleu*, Dozent, Dr. habil., Hann. Münden, Institut für Jagdkunde, D.B.R.
- Neal, Larrett*, Mr., 6 Dolphin House, Market Square, Dover, Kent, England.  
Roedeer.
- Nevenic, Vladislav*, Prof., Dr., Beograd, Yugoslavia.
- Niethammer*, Prof., Dr., Bonn/Rhein, Koblenzer Str. 162, D.B.R.
- Nüsslein, F.*, Professor, Hann. Münden, Institut für Jagdkunde, D.B.R.
- Paludan, K.*, Dr. phil., Vildtbiologisk Station, Kalo, Ronde, Danmark.  
Game birds. Population dynamics.
- Pringalle, Guy*, Ingenieur des Eaux et Forêts, Conseil Supérieur de la Chasse, 243, Bd. St. Germain, Paris 7e, France.  
Elevage des Gallinaces-Gibiers.
- Rajala, Paavo*, Fil. Kand., Oskelantie 1 a 2, Haaga, Finland.  
Grouse—nutrition and rearing.
- Richter, Johannes*, Diplom-Forstwirt, Eberswalde, Am Zainhammer 2, D.D.R.  
Wildkrankheiten, Rehwild.
- Rieck, Walter*, Dozent, Dr., Hann. Münden, Institut für Jagdkunde, D.B.R.  
Feldhase, Rehwild.
- Schuitemaker, W. J.*, Chief of the Department of Wildlife Management, 215 Bezuidenhoutseweg, The Hague, Holland.
- Smidt, Leandert*, Forstmeister, Dipl. Ing., Wien XIII, Stuwackengasse 23, Österreich.
- Spärrch, R.*, Professor, Dr. phil., Zoologisk Museum, København K, Danmark.  
Research on animal nutrition.
- Strandgaard, H.*, Mr., Vildtbiologisk Station, Kalo, Ronde, Danmark.
- Suomus, Heikki*, M. Sc., Unionink. 45 B 42, Helsinki, Finland.  
Small game. Rearing.
- Thamdrup, Harald M.*, Museumsdirektør, Naturhistorisk Museum, Aarhus, Danmark.  
Ecology.
- Thompson, Harry V.*, Mr., Ministry of Agriculture, Fisheries & Food, Infestation Control Division, Hook Rise, Surbiton, Surrey, England.  
Population Balance. Economic Factors.
- Tilgner, D. J.*, Prof., Dr., Politechna Gdanska, Gdansk, Wrzeszcz, Poland.  
Hasen. Rehwild. Schwarzwild. Qualitätsbewertung — Technologie.
- Türcke, Friedrich*, Forstmeister, Forstamt Saupark, Springe/Hann., D.B.R.  
Wildschadenverhütung.
- Ueckermann, Erhard*, Dr., Assessor des Forstdienstes, Meckelfeld über Harburg 1, Höpenstrasse 9, D.B.R.  
Wildschadenverhütung. Wildstandsbewirtschaftung. Schalenwild. Oekologie Schalenwild.
- Ulhøjær, Kai*, Mr., Vildtbiologisk Station, Kalo, Ronde, Danmark.

Third Congress of The International Union of Game Biologists Aarhus 1957

*Wahlgren, Fredrik*, Med. Dr., Överläkare, Södersjukhuset, Stockholm, Sverige.

*Valentincic, Stane*, Prof. Dr., Ljubljana, Titova cesta 25, Jugoslavija.

Rotwild. Fasan.

*Webb, William L.*, Ass. Professor, Dept. of Forest Zoology, State University of N. Y., Syracuse, N. Y.,  
U. S. A.

*Whitehead, G. Kenneth*, Mr., Old House, Withnell Fold, Chorley, Lancashire, England.

*Vibe, Christian*, mag. scient., Zool. Museum, København K., Danmark.

Arctic game species.

*Xylander, Eberhard Ritter von*, Forstassessor, Hann. Münden, Institut für Jagdkunde, D.B.R.

CONGRESS MEMBERS

(Geographically arranged)

AUSTRIA:

Amon, Rudolf.  
Smidt, Leandert.

DENMARK:

Andersen, Johs.  
Christoffersen, Finn.  
Jensen, P. Valentin.  
Paludan, K.  
Spärck, R.  
Strandgaard, H.  
Thamdrup, H. M.  
Ulfkjær, Kai.  
Vibe, Christian.

FINLAND:

Grenquist, Pekka.  
Helminen, Matti.  
Rajala, Paavo.  
Suomus, Heikki.

FRANCE:

Pringalle, Guy.

GERMANY:

D. B. R. :  
Behnke, Hans.  
Brüll, Heinz.  
Frank, Harry.  
Haltenorth, Theodor.  
Katzenmeier, Philipp.  
Leonhard, H.  
Müller-Using, Detlev.  
Niethammer.  
Nüsslein, F.  
Rieck, Walter.  
Türeke, Friedrich.  
Ueckermann, Erhard.  
Xylander, Eberhard Ritter von.

D. D. R. :

Gäbler, Hellmuth.  
Linke, Wilhelm.  
Richter, Johannes.

HOLLAND:

Eygenraam, J. A.  
Fremery, R. F. de.  
Hardenberg, J. D. F.  
Schuitemaker, W. J.

## CONGRESS MEMBERS

*(Geographically arranged)*

continued

### NORWAY:

Hagen, Yngvar.  
Lund, Hj. M-K.

### POLAND:

Iwanowski, Kazimierz  
Jaczewski, Zbigniew.  
Tilgner, D. J.

### SWEDEN:

Borg, Karl.  
Wahlgren, Fredrik.

### UGANDA:

Brooks, Allan C

### UNITED KINGDOM:

Blank, T.  
Cameron, J. D.  
Coles, C. L.  
Darling, F. F.  
Evers, G. Harvey.  
Hewitt, R. M.  
Konopka, A.  
Lowe, V. P. W.  
Matthews, G. V. T.  
Neal, Larrett.  
Thompson, Harry V.  
Whitehead, G. Kenneth.

### UNITED STATES OF AMERICA:

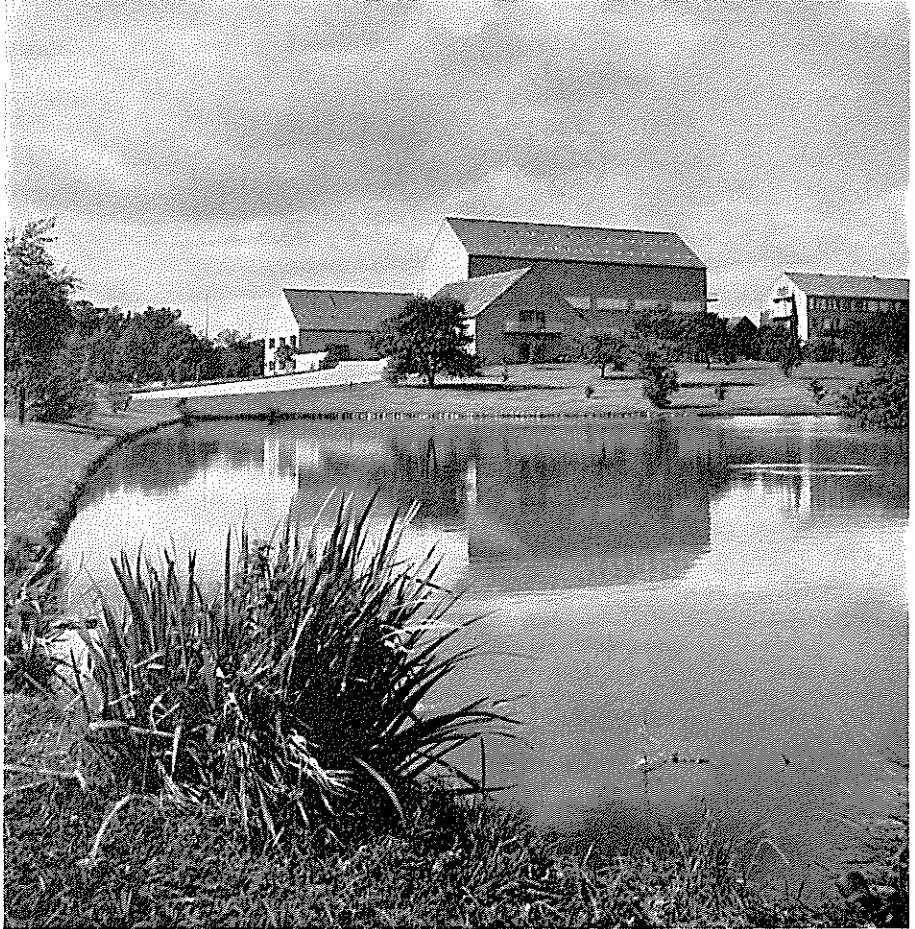
Webb, William L.

### YUGOSLAVIA:

Jaksic, B. L.  
Nevenic, Vladislav.  
Valentincic, Stane.

## ASSOCIATE MEMBERS

Brüll, Ilse, Mrs., Germany.  
Frank, Leni Maria, Mrs., Germany.  
Fremery, A. H. de, Mrs., Holland.  
Dittlinger, V., Mrs. Holland.  
Neal, Evelyn, Mrs., England.  
Schuitemaker, Th., Mrs., Holland.  
Thamdrup, Ebba, Mrs., Denmark.



The Museum of Natural History, Aarhus

## THE CONGRESS PROGRAMME

### *General Summary*

FRIDAY, 11 OCTOBER

19,30 *Reception of Congress Members and Ladies in Naturhistorisk Museum*

SATURDAY, 12 OCTOBER

10,00 *Inaugural Meeting, Naturhistorisk Museum Lecture Room*

The President of the Congress, H. M. Thamdrup, addressed the Congress by pronouncing:

“Honorary President, Ladies and Gentlemen,

At the Second Congress of the International Union of Game Biologists in Graz two years ago, Denmark was entrusted with the organization of the next Congress.

Now, before the opening of our Third Congress, we express our sincere hopes that it will prove a worthy continuation of valuable foundations laid down at the two previous meetings.

Credit must be given to many contributing factors if, at the present Congress, we shall be successful in exchanging views and developing new contacts at a sufficiently high level to promote the branch of biology on behalf of which we are here.

Game biologists in many countries, the Deputy Presidents, and the Union Representatives of the member countries have, already during the planning stage, made generous contributions towards making this Congress as comprehensive and varied as at all possible. The Danish organizing committee takes pleasure in extending its most sincere thanks for these efforts.

When Danish game biologists have ventured to shoulder the task of arranging this Congress our thanks should go not only to our colleagues abroad but also to many helpers within this country. It is of great importance that for several years our young branch of biology has enjoyed a good contact with the sportsmen as well as the interest and support of the authorities. In Denmark, game and game research is within the province of the Ministry of Agriculture, and I would like to mention here that through his insight and understanding the Permanent Under-Secretary of State for Agriculture, Poul Stahlschmidt has made invaluable contributions towards the advancement of game research in our country. Also for the planning of the Congress this support was most important. It is, therefore, a pleasure to me to express our gratitude that hr. departementschef Stahlschmidt has consented to act as Honorary President of this Congress, and that he has been able to find the time to be present here at the Inaugural Meeting in order to address Members.

I have the honour to call upon Departementschef P. Stahlschmidt.”

The Honorary President opened the meeting with the following words:

"Mr. President, Ladies and Gentlemen,

As Honorary President of The Third Congress of the International Union of Game Biologists—1957—I have the pleasure to extend a cordial welcome to the delegates to Denmark.

In recent years, game research has made rapid progress in all parts of the world. One of the reasons for this is, no doubt, that conditions have deteriorated for many species of game as a result of increasing human interference with their living and sustenance.

If we want to maintain a reasonable and well-balanced population of game in environments where landscapes are being increasingly re-shaped, thorough scientific studies are an inevitable condition for the success of rational consideration of the problems involved.

In this country game research has been going on for many years, but it was not until 1949, when the Danish Game Research Station was established at Kalo, that this work could be extended over a wider front.

Although the Danish Game Research Station is thus a fairly young institution, it has already published a number of reports which—together with other Danish studies of game biology—form a valuable foundation for further activities in this field. In the administration of our game laws, for instance, it has been very useful for us that the Research Station has been able to combine scientific research with practical studies of game preservation, regulation of game population, and other problems.

From the Congress programme, I notice that similar problems are being dealt with in other countries.

The study of game and the desire to help preserve the game population seem to form strong ties between game biologists all over the world, and their work in these fields should be followed with the keenest attention by all interested parties, whether they be hunters, sportsmen, administrators, or just ordinary people who love nature in all its manifestations.

I hope that this Congress may give you opportunities through discussion and exchange of experience, to widen your knowledge of problems of mutual interest, for the benefit of research in game biology and for international co-operation in this field.

Mr. President, Ladies and Gentlemen, I hereby open The Third Congress of The International Union of Game Biologists, 1957."

Following these words of welcome the President spoke:

"Expressions of goodwill and wishes for good results always make good company when one is facing a piece of work. We have had the pleasure of being met with such wishes here to-day and, on behalf of the Congress, I would like to express our sincere thanks to Departementschef Stahl-schmidt. Also I am pleased to mention that on occasion of this Congress cordial greetings have been received from The American Wildlife Society—the organizer of meetings of American Game Biologists attended by about a thousand persons—and from the Game Department of the U.S. Ministry of the Interior. The Wildlife Society has delegated Professor William Webb from the State of New York to attend our Congress. I extend a cordial welcome to Professor Webb and ask him to convey our best regards back into the U.S. We may hope that the present contact between American and European Organizations of Game Biologists is a step towards strengthening the connection between the two Organizations and their Members.

On behalf of the Congress I take this opportunity to express our sincere thanks to the Town Council for providing the quite special setting for one of our meetings and to the University for permitting us to have lunch in the University Refectory.

It is a pleasure to have the chairman of the Museum Council—Lektor V. R. Møller—among us to-day. On behalf of the Game Biologists—which I represent on this occasion—I beg to express our most sincere thanks to the Council for letting us hold our Congress here. May I also express our gratitude to the hosts during our excursions: Kalø Game Experiment Stations, to professor, Dr. A. Howard Grøn, Løvenholm, to Lensgreve H. C. Schimmelman, Lindenberg, to count G. Ahlefeldt Bille, Egeskov Fjellebro, to museumsinspektør H. Scheel, Hørsholm and to Kgl. skovridder A. Tage-Jensen, The Royal Deer Park, Copenhagen.

It is a pleasure that several Ladies have decided to accept the invitation to join. On different occasions we shall have the pleasure of their company at the Congress. In order to give the Ladies an impression of other things than just game problems we have made an effort to arrange some special excursions which, we hope, may contribute towards making the stay pleasant, instructive and worthwhile.

Already now I would like to draw attention to a proposal made by one of the Deputy Presidents, Mr. Coles. He proposes that quite small groups be formed for a cooperation and for a more detailed discussion of selected topics. The meetings should be held outside the official programme, and only members that personally deal with research on the topics in question are invited to take part in such groups. Some afternoons and certainly some evenings will offer opportunities for these discussions. Among topics that would be suitable for this approach can be mentioned (1) Propagation and release of pheasants and partridges (2) duck problems in North and West Europe and (3) deer damage and countermeasures against it. Mr. Coles is going to say a few words about the proposal in connection with his talk on rearing and stocking problems this afternoon.

Lastly it is my task to propose Chairmen of the Meeting. Each Chairmanship comprises the talks of one morning or one afternoon. The following Members have consented to take on this onerous task: Dr. Eygenraam, Mr. Coles, Dr. Frank, Dr. Borg, Professor Valentincic, Professor Nüsslein, Professor Gäbler, Dr. Amon and myself."

Since no alternative proposals were made this list of Chairmen was accepted.

As an introduction to the special programme a lecture by A. D. Middleton: "Management and Conservation of Game Birds in Britain" was read by C. L. Coles (cf. p. 28).

Closing the inaugural meeting a film on the Kalø Game Experimental Farm was shown.

Saturday afternoon was devoted to special meetings concerning pheasants and partridges (pp. 30, 34, 36).

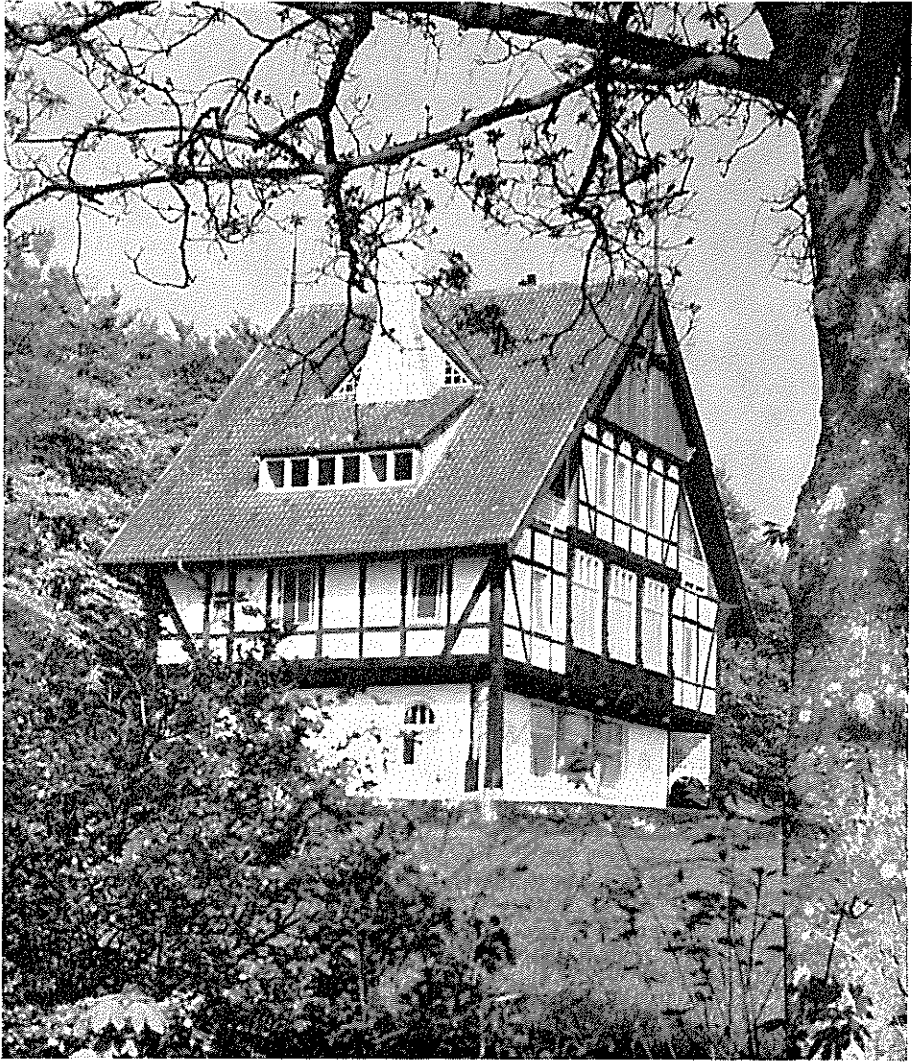
SUNDAY, 13 OCTOBER

*Excursion to Kalø*

In the year 1948 the Estate of Kalø was rented by the Game Licence Foundation with the express purpose of establishing a Game Research Station and a Game Experiment Farm.

Kalø is situated on the North coast of Aarhus Bay 30 km North of Aarhus.





The Danish Game Research Station at Kalø

The area is about 1 000 ha. Of this 340 ha. are woodland which falls into two separate woods, Hestehaven (176 ha.) and Ringelmoseskoven (164 ha.), about 500 m. apart.

Surrounding and in between the two woods is arable land. The terrain is hilly

and sloping towards the sea. In most places the soil is a fertile boulder clay and the woods as well as the arable land are intensively cultivated.

The woods are mixed, more than one half consisting of beech (52 per cent.), oak contributes 6 per cent., various other deciduous trees (alder, poplar, ash) 5 per cent. and conifers (various species of spruce, larch and a little thuja) 35 per cent.

It is noteworthy that a large part of the wood consists of young, dense plantings.

As a consequence of a change in management in 1930 and the compulsory thinning during World War II several of the old sections have been replaced by young plantings.

No less than 43 per cent. of the total woodland area carries plantings less than 25 years old. Hence the present appearance of the wood is that of many dense plantings scattered throughout the old and more open wood.

As a habitat for roe-deer the wood is particularly favourable. Other larger mammals present are hares, a small stock of foxes and badgers. Pheasants, a large number of wood pigeons and an artificially reared stock of mallards are the main game birds. Partridge are only few in number on the estate.

#### Excursion points of the area.

*Spruce artificially barked* in order to study the growth-retarding influence as compared with undamaged trees. The volume of wood is being determined at regular intervals. The experiments are made in connection with a deer-damage programme.

*The Game Advisers School.* The chief of the school, Chief Game Warden Count G. Ahlefeldt Bille gave a short review of the activity of this place. Each year 4 pupils are trained. They have all had two years practical training as trainee game wardens before attending the school. Daily management of the school: Head Keeper J. Bjerg Thomsen.

*Forage field.* Old nursery. Now used as forage field for roe-deer. Fence not opened until December; it is much visited by roe-deer which come from all over the wood. It is planted to marrowstem kale, (fodder) sugar beets, perennial rye and artichokes.

*Roe-deer traps.* Used during the winter for capturing roe-deer with a view to marking experiments and population counts.

*Spraying experiments.* The area is used for pilot experiments on the prevention of roe-deer damage to young trees.

*The duck-farm.* The ponds harbour a flock of 125 ducks and 25 drakes. The lake is artificial. Eggs are collected and hatched under hens or incubated. The last eggs of every season are hatched by the ducks.

*The Game Experiment Farm* represented by P. Stahlschmidt, Permanent Under-Secretary of State, was host at lunch for Congress Members and Ladies.

*During the afternoon* the Game Biology Station and the experimental rearing of pheasants, partridges and mallards was demonstrated, and short lectures concerning the research programme of the Station were given in German and English.

MONDAY, 14 OCTOBER, AND TUESDAY, 15 OCTOBER

*Special lectures were given on small game (p. 39-72).*

Monday H. Frank presented the interesting film: "Tiere in Wasser- und Heidereviere".

WEDNESDAY, 16 OCTOBER

9,00 *Meeting on General and organizational problems.*

Chairman: Professor F. Nüsslein.

H. M. Thamdrup presented summaries of

1. The organization and scope of Game Research in a Number of European Countries (pp. 73).

2. Methoden zur Registrierung der jährlichen Schwankungen des Wildbestandes und des Jagdertrages in mehreren europäischen Ländern (pp. 91).

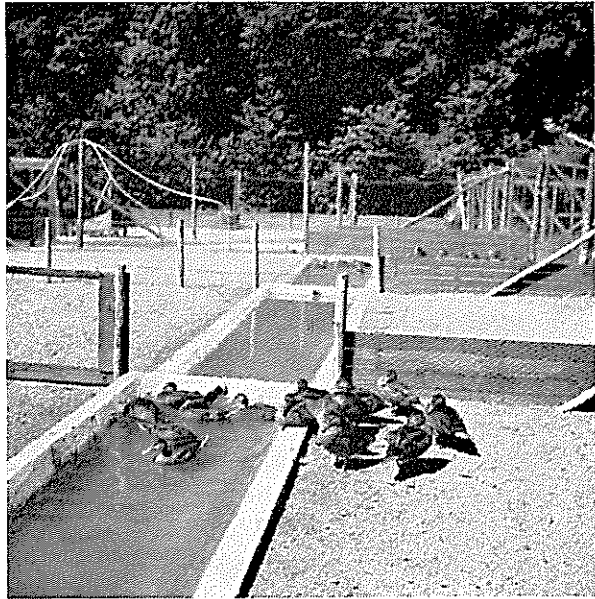
#### Organizational questions:

1. *Meeting place for next Congress.*

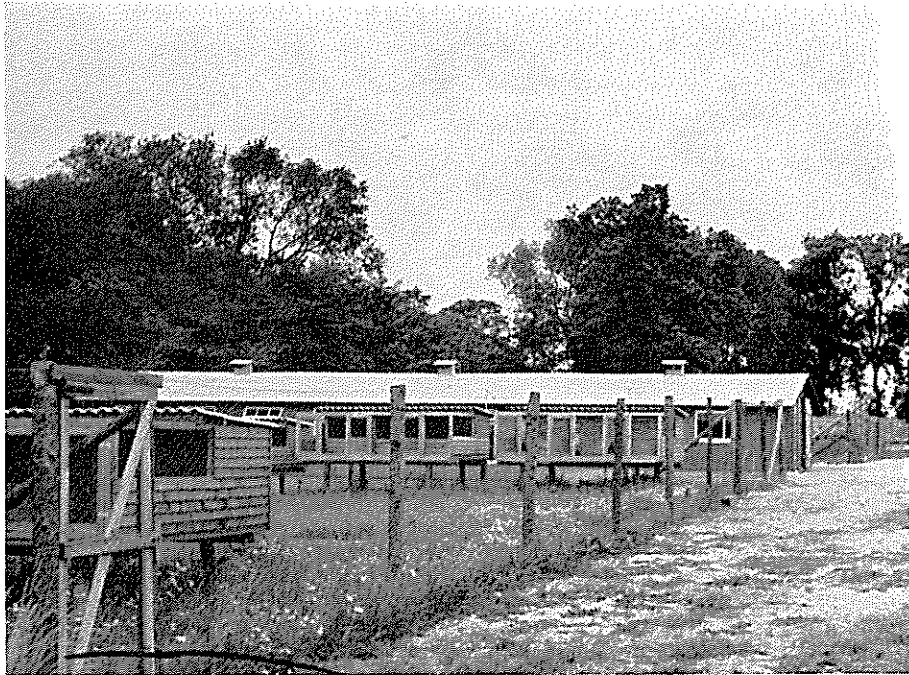
W. J. Schuitemaker, on behalf of the Dutch delegates, brought an invitation from Holland. The invitation was unanimously accepted by the congress, cordial thanks being expressed by the chairman.

2. *Meeting time for next Congress.*

After some discussions whether congress was to be held every or every second year, it was decided that the last proposal would be adequate. Time for next congress will therefore be 1959.



Ducks, Pheasants and Part-ridges are reared for Research Purposes at Kalö, — Below: Breeding - Pens with Floor of Wire-Netting.



3. *Election of Committee for preparing next Congress.*

The following members were elected:

J. A. Eygenraam, President,  
C. L. Coles, Vice President,  
F. Nüsslein, Vice President,  
H. M. Thamdrup, Vice President.

In connection with this election the following members were, for the coming two years, appointed as representatives of the Union for the countries mentioned below:

Austria: R. Amon,  
Czechoslovakia: B. Bubenik  
Denmark: H. M. Thamdrup  
Finland: L. Siivonen  
France: G. Pringalle  
Germany: (D.B.R.) F. Nüsslein  
(D.D.R.) H. Gäbler  
Holland: J. A. Eygenraam  
Norway: Y. Hagen  
Poland: D. J. Tilgner  
Sweden: The Game Research Council  
United Kingdom: C. L. Coles  
Yugoslavia: Stane Valentincic

4. *Other Business.*

Questions concerning the reviews of lectures given at the Congresses and the proceedings of the meetings were discussed.

In connection with the present Congress these problems were already solved. As announced in the invitations, the Danish organizers had from the beginning made arrangements for official proceedings containing all the authors' abstracts of the papers given at the Congress, the detailed reports upon the discussions etc. It was stated, that on this occasion there would—in distinction to the Congress in 1955—be no need for help from e.g. *Zeitschrift für Jagdwissenschaft* in this connection. It was understood that this periodical as well as other special periodicals naturally would be open for those authors who might want to have their lectures printed in entirety.

As in Graz a question was put forward whether some sort of central institute for the International Union of Game Biologists should be organized. But, just like in Graz, it was decided that no such institute would be needed.

As a representative of the American Wildlife Society Professor William L. Webb brought greetings from this society with good wishes for our Union, its future work and a growing contact between the European and American societies.

12,00:

In connection with Lunch in the University Refectory members of the Congress were given an opportunity to visit some of the institutes and Colleges of the young Aarhus University.

15,00:

This afternoon the Town Council was host at Reception in the Town Hall of Aarhus. The Congress members and ladies were addressed by the alderman Bernhardt Jensen.

After tea three excellent and interesting films were presented:

G. Kenneth Whitehead: "Red Deer of the Mountains" and  
"Père David Deer".

Christian Vibe: "Animal Life in East Greenland".

Mr. Kenneth Whitehead's introductions to his two films are printed at p. 124.

#### THURSDAY, 17 OCTOBER AND FRIDAY, 18 OCTOBER

were devoted to special meetings concerning Deer and Deer damage. (p. 163).

Friday, 18 October an Evening Reception with Supper for Congress members and Ladies was held at Hotel Regina.

Although the Congress programme itself was dealing fairly extensively with special items from morning till late afternoon, the members in several cases wanted to contribute discussions on certain problems during quite informal sessions which were arranged in the evenings for bigger and smaller groups. The themes for these sessions were: Hares, Roe-deer, Pheasant and Partridge rearing and restocking, and Duck-problems in North- and West-Europe.



Congress Members listening to Professor Howard Grøn(\*) at the Excursion to Lövenholm.  
(Borg phot.)



## POST-CONGRESSIONAL EXCURSION PROGRAMME

After one week's lectures and meetings in Aarhus an excursion was made to two areas where Red Deer damage and its effects could be studied. First a visit was paid to the extensive forest district of Løvenholm. Professor Howard Grøn, the Administrator of Løvenholm, demonstrated Red Deer habitats and various types of deer damage. A number of trunks had been sawn through in order to expose the effect of early barking by deer.

Afterwards Professor Howard Grøn was host at a lunch in the old Løvenholm Castle.

In the afternoon the excursion continued north to a rather exceptional area, a privately owned deer park in the largest raised bog in North Europe, and to Toft Forest. The owner, Count Schimmelmann, demonstrated Red and Roe Deer heads from the Estate. During a tour of the Estate Red and Roe Deer were seen—the local Red Deer herd counts 5–600 heads. A Wild Boar passed the party within reach of the cameras. The species does not occur wild in Denmark, and all enjoyed this quite exceptional event.

The size of the deer park is such that the visitor hardly realizes that it is fenced, and the animals retain their inherent shyness.

When the Congress in Aarhus came to an end on 18 Oct. a 3-day excursion to various parts of Denmark was arranged for those especially interested. On 19 Oct. the party left Aarhus by bus heading for West Jutland.

En route, Professor Spärck gave an account of the nature of West Jutland and its geological background. A visit was paid to Tipperne in Ringkøbing Fjord, the largest bird sanctuary in Denmark, and members took advantage of the opportunity to do some bird watching. Several species of geese had made a halt on Tipperne on their passage from the breeding grounds in the arctic region to their winter quarters.

The laboratory, observation tower, and living quarters aroused the interest of the members, and an account was given of the history and wild life of Tipperne.

In the afternoon the party was taken through part of the characteristic scenery along the west coast of Denmark. The extent of sand dunes is considerable, and in order to minimize sand drift the dunes have in part been planted to conifers, and a radical change of scenery and habitats has taken place. The animal life of heathland and dunes has been replaced by Red and Roe Deer etc. This change has taken place quite recently. The Director of the Danish Dune Plantations, Mr. P. Thaarup, gave an account of this and answered many questions about the unique scenery. Experimental fields laid out by the Game Research Station were also inspected. Here 15 different crops were tested in order to identify the



plants preferred by Red Deer during the seasons when their damage to agricultural land reaches a maximum. It has been planned to lay out a number of such suitable fields within the plantations and thereby to reduce the foraging activity of Red Deer in the adjoining arable land. The excursion continued back to East Jutland and the night was spent at Hotel Australia in Vejle.

Monday was spent on two old Estates on the fertile island of Fyn. For centuries the estates have been in the possession of members of the Danish nobility. Some estates still persist where hunting traditions have been held in veneration.

The first visit went to the Estate of Ravnholt where the party was most kindly received by Mr. and Mrs. Sehestedt Juul. An account was given of the game resources of the estate and heads of Roe Deer, Fallow Deer and Sika Deer were demonstrated. During the tour of the estate a number of Roe deer were seen but, unfortunately, only one Fallow Deer.

After lunch a visit was paid to Fjellebro which is owned by the Danish Chief Game Warden, Count G. Ahlefeldt Bille. Count Ahlefeldt showed his impressive collection of African and Indian trophies and an interesting collection of Roe Deer heads from the herd of the Estate. Examples of game management on the estate were also demonstrated.

The excursion continued to Copenhagen. On Tuesday, 22 October, the last day of the Congress, a visit was paid to the Royal Deer Park near Copenhagen, interesting because of its large herds of deer and very popular among the Copenhageners as a holiday resort. The Royal Forest Superintendent, Mr. Tage-Jensen, and the 'jægermester', Mr. Eriksen gave an account of the history and game resources of the Deer Park, while heads of Red Deer and Fallow Deer were demonstrated. A demonstration of forage fields was also given and various problems of game management were commented upon.

Many deer, especially Fallow Deer, could be watched at close quarters. Also Red Deer and Sika Deer were seen.

The beautiful scenery, the deer, sunshine and autumn colours, everything contributed to the success of this last day.

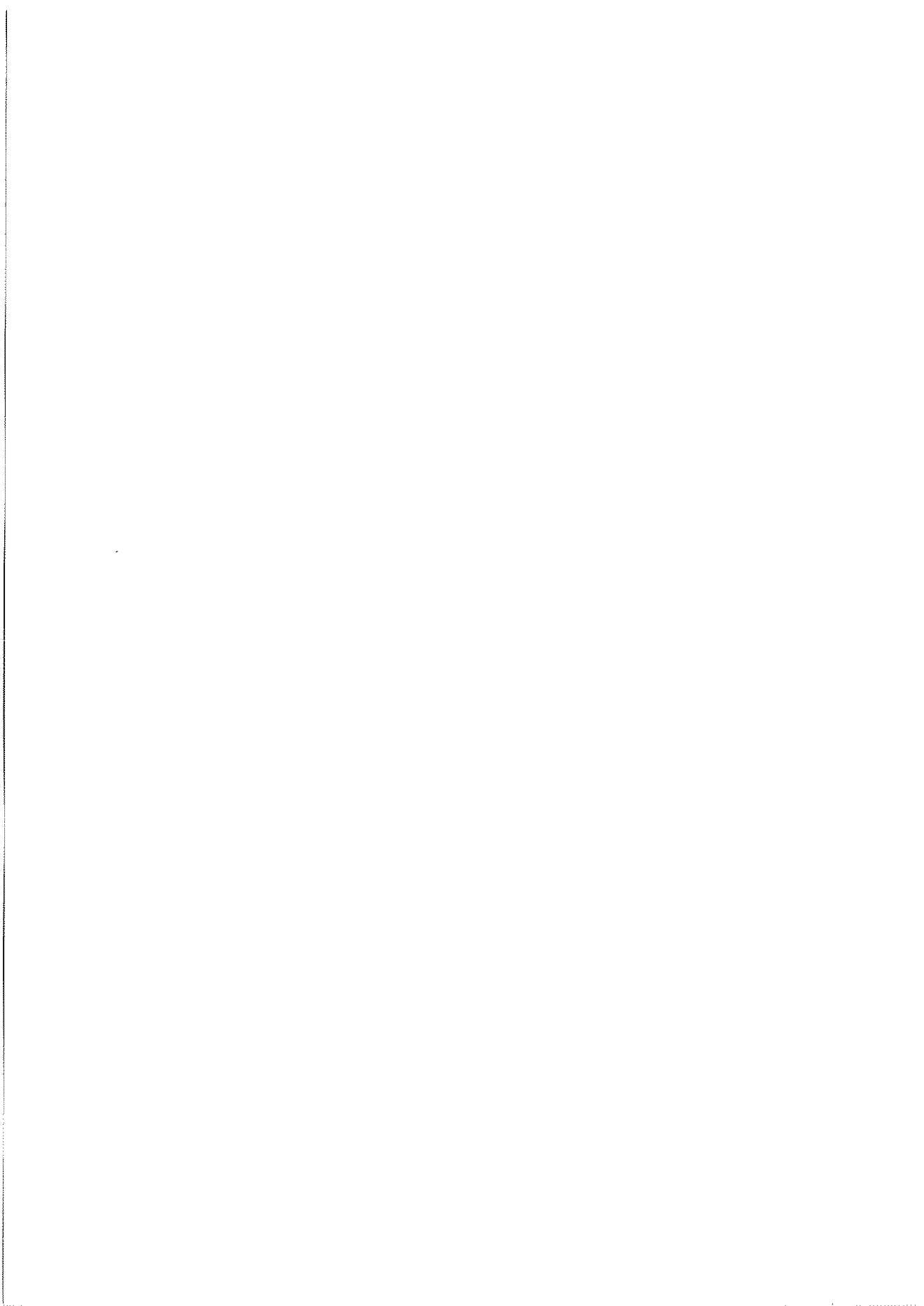
En route back to Copenhagen we visited the Game and Forestry Museum at Hørsholm. The party was conducted through the Museum by the Director, Mr. H. Scheel and by Dr. Bøje Benzon. The Museum illustrates Danish game and forestry through exhibitions sufficiently rich to reward several hours' study.

In Copenhagen members parted for their home countries in East and West, the Congress had come to an end but, we hope, some good memories of Denmark may last.



Dune Plantations in West-Jutland. A Danish Red Deer Biotope (above). —  
The "Tipper-Station" (below).





ABSTRACTS OF PAPERS AND DISCUSSIONS

Alphabetical List of Authors p. 11 – List of Papers in chronological Order p. 165

SATURDAY, 12 OCTOBER

10,00 Inaugural Meeting:

MANAGEMENT AND CONSERVATION OF GAME  
BIRDS IN BRITAIN

*A. D. Middleton*

I. C. I. Game Research Station, Fordingbridge, England

This paper was read at the Congress by Charles Coles

The most important game birds in Great Britain are the partridge (*Perdix perdix*), the pheasant (*Phasianus colchicus*) and the red grouse (*Lagopus scoticus*). The right to kill game goes with the ownership of land so game protection and conservation is largely controlled by the individual landowners, subject only to laws fixing the close seasons and protecting certain other species (e.g. predatory birds). There is no game conservation research or service supported by the Government, but a Game Research Station and Advisory Service on game management is maintained by the makers of sporting ammunition. A research project on grouse ecology has recently been started with funds provided by landowners.

Under these conditions an intensive system of game management has developed with the object of building up the maximum stock of game birds (often including large numbers of artificially reared pheasants) on the limited areas of the preserved estates employing gamekeepers. This system naturally results in alternating areas of high game density (keepered shoots) and low density areas where game management and protection is neglected, rather than a uniform density over all suitable environment. Apart from the grouse moors in the north and west of the country, most of the environment for pheasants and partridges is cropped land controlled for farming and forestry. Game production is, therefore, becoming an integral part of land use, subsidiary to agriculture and forestry—game birds for shooting being regarded as a profitable “by product” of farming and forestry.

Management methods for the maximum production of game may be summarised as follows:

- (1) The maintenance and improvement of the environment for partridges and pheasants by a planned interspersion of farm and woodland crops—cover and

feeding range—without interfering with normal farm crops and sylviculture.

- (2) Protection of game by "keeping": selective predator control and the prevention of losses due to cultivation hazards.
- (3) Production of game by artificial rearing for restocking and augmenting stocks on land carrying a low density of wild game.
- (4) Carefully controlled shooting of only the annual surplus crop of game, allowing for natural mortality and movements and the maintenance of adequate breeding stocks.

Although such methods are being applied successfully, with high yields of game, on many estates, kepted shoots and farms, there are very large areas—probably more than half the total available area—suitable for game production but at present carrying very low stocks and providing little or no shooting. There is an obvious need for the application of more widespread conservation measures, improved and economic methods of management and further ecological research.

SATURDAY, 12 OCTOBER

14.00 Chairman: J. A. Eygenraam. Secretary: Johs. Andersen.

## A REVIEW OF PHEASANT PROPAGATION METHODS IN GREAT BRITAIN

*Charles Coles*

I. C. I. Game Research Station, Fordingbridge, England

### *Rearing.*

There are three main methods of rearing:— the free-range method, with coops and broody hens: predator-proof movable pens, each for a broody and fifteen pheasant chicks: brooders with grass runs, usually in 100 chick units. We have experimented with intensive rearing methods, keeping the birds indoors or on wirefloors, deep litter, etc., but we have not been so successful as when allowing the birds access to grass from the first day.

The main losses on the open rearing field are due to predation, and exposure. Keepers have to be on watch all day. 70% to 75% of the birds are usually taken to covert, at 7 weeks. In predator-proof pens and brooders, 80% to 90% are usually taken to the woods, about a week earlier.

Where electricity is available, we prefer infra-red dull emitter heaters, but oil and Calor gas heating are also excellent. The birds are taken away from the brooder heat at 3 weeks, to a "hardening off" pen, with only a rain-shelter under which they are driven at night and during rainstorms. From here they go to the woods where they are penned for a further 3 weeks before being released in batches.

Coccidiosis and Blackhead can now be controlled well: Gapes can still be a killer. More losses occur due to exposure, poor feeding and incorrect management, than disease.

### *Chick Feeding.*

We have had the best results—as regards early growth rate—by feeding 28% protein balanced "starter" crumbs for 2 weeks, followed by 24% "rearer" crumbs: at 3 weeks the ration is  $\frac{1}{2}$  wheat and  $\frac{1}{2}$  crumbs, and adequate green-stuff.

Birds started on commercial 19% poultry chick crumbs—weighed less at 6

weeks, but had developed normally by the time they were adult. The high-protein start may not be as important as was supposed.

#### *Weights.*

Since chicks have been fed on crumbs, in self-service troughs, their weight has gone up. Five years ago a 6 week old Blackneck poult (unsexed) averaged 250 grammes. These poults now weigh over 300 grammes and some batches occasionally weigh 400 grammes.

#### *Feather-Picking and Nervous Conditions.*

If we get feather-picking it is effectively controlled by debeaking the birds at 18 days. When birds were debeaked at 25 days, they appeared to suffer a more serious setback than those debeaked at 18 days. Day-old chicks have died as a result of debeaking.

Since the introduction of concentrated foods and semi-intensive rearing, some pheasant poults have suffered from tailshedding or tailpulling in covert at 6/7 weeks. It is possible that this may be associated with a stress factor. A number of poults have died as a result of what appears to be a nervous condition, with symptoms not unlike crazy-chick disease. Sometimes they are in poor condition and badly feathered, but at other times they are quite well-developed. The use of coccidiostats, and of high-protein diets—fed over too prolonged periods—have been suggested as contributory causes.

#### *Releasing Birds.*

Between 1951-55 we tagged 14,176 reared pheasants in different areas: an average of 30% were shot on or near the home shoots, and a further 3.2% recovered nearby having died from disease, predation, etc. In 1956, we tagged 11,184 birds. 45.5% were recovered in that year—38% being shot on or near the home shoots.

Some limited trials indicated that we obtain a better recovery rate from birds released at 8 weeks, after penning, than at 6 weeks. Much more research work is obviously needed on the planting-out of reared game.

#### *Breeding.*

To produce hatching eggs, gamekeepers catch-up wild pheasants at the end of the shooting season. These birds are usually put into large wired-in grass enclosures—1 cock to 6 hens.

The egg output is quite good, but the fertility is usually slightly below that of eggs laid in small pens. Long, low laying arcs, with two compartments, give



greater shelter and privacy, and both wild pheasants and gamefarm pheasants lay in them extremely well. The small, dual-purpose rearing and laying pen (10' × 6') is suitable for a cock and four or five gamefarm hens, but is too confined for wild pheasants. Pheasant farmers often use rows of 8 yds square block pens, each one holding 6 hens and 1 cock.

Our egg yield from Blacknecks (April and May 1957) was 44.6 eggs in the laying arcs, 46.2 eggs in fixed pens 8 yds square, and 35 eggs in 10' × 6' movable pens.

Our egg production (April and May) from the different breeds during the last three years has been: Blacknecks—36.9 eggs per hen, Wild Hybrids (Gamefarm Stock)—36.4 eggs per hen, Chinese—35.1 eggs per hen, Mongolian—32.6 eggs per hen and Melanistic Mutant—27.4 eggs per hen.

During 1957, our caught-up wild pheasants laid 14.6 eggs up to May 15th in the small 10' × 6' pens, and 28.1 eggs in the big laying arcs. After release, the nests of 8 wild hens that we found averaged 9 eggs each.

#### *Fertility and Hatchability.*

The fertility of our gamefarm pheasant eggs over the last five years has always been good—varying slightly according to breed—from Wild Hybrids (Gamefarm Stock) 97.6% to Melanistic Mutants 93.2%.

The hatchability has not been so satisfactory. Over the last five years our average hatch (1 500 egg sample per year) has been: from eggs set—69.2%, and from possibles—74.1%.

We have tried a number of breeder's diets—with protein levels varying from 17%–27%, and have had fairly satisfactory results from balanced 18% protein pellets, with a quarter ration of wheat; we still feel we have not discovered the perfect diet.

We do not know all there is to know about handling and storing eggs. We feel it is also possible that there is an inherited factor in some strains of gamefarm pheasants, for under the same broodies gamefarm eggs do not usually hatch off as well as wild eggs that are brought in.

In connection with the paper the film "More Pheasants" was presented.

#### DISCUSSION:

EYGENRAAM: Can you say something about eventual differences in habitat preferences of the different pheasants you are working with?

COLES: We study the wild hybrid strain of pheasant, and torquatus, mongolicus, tenebrosus and colchicus. We have not noticed any habitat preferences: all these breeds appear to be extremely adaptable. I believe the strain (or physiological variety) to be more important than the species.

BORG: Which means have been used against coccidiosis, and how have they been used. Have they had some unfavourable effect on the birds?

Has Phenothiazine been used against gapes, and how has it turned out to be?

COLES: a. *Sulphamezathine for treatment.* 0.1%–0.2% added to drinking water as soon as the bloodstained droppings appear, for 3–5 days, according to intensity of disease; then plain water for 2 days, followed by another treatment for 3 days. No ill effects.

*Nitrofurazone (and similar drugs) for prevention.* Medicated foods are given from the start at the level of 0.005%. Slight overtreatment is liable to produce unpleasant symptoms in fowls, and although no specific tests have been done on gamebirds, we suspect that this method of treatment may have caused troubles of various sorts. Sulphamezathine is considered the better and more effective drug.

b. Phenothiazine has no effect on adult gapeworms, though it will kill larval gapeworms, if they happen to be present while the drug is effective.

BRÜLL: Do you have any observations of natural losses on account of different colouring of the pheasants in different neighbouring localities?

COLES: We have not noticed any.

TILGNER: Is there a correlation between the increase in quality and weight of wild and bred pheasants due to better breeding conditions?

COLES: I am doubtful as to the increase in quality, but the increase in weight of handreared stock is due to feeding methods. *Torquatus*, *mongolicus* and *colchicus* are heavier breeds—particularly *mongolicus*—than the wild hybrid.

WEBB: Dr. Ollie Hewitt of Cornell University, Ithaca, New York, is experimenting with the use of the new tranquilizing drugs to control feather picking in pheasants under game farm condition.

COLES: We hope to try tranquilizing drugs next season.

THAMDRUP: How is it decided where to release pheasants? Do you have places where under natural conditions you have *no* pheasants, and where release would mean an introduction?

What is the price of pheasant chicks of 6–8 weeks old?

COLES: a. We usually release young pheasants in paths or open spaces inside woodlands, but effective liberations have also taken place in farm crops. In some areas which will not grow a large *wild* pheasant crop, annual restocking with reared birds is the only way to produce a good pheasant harvest. In other areas, the handreared birds augment the wild pheasant crop, and provide more shooting days. In a few areas, where natural conditions are good, handrearing is of little or no value.

b. There are a few such places (particularly in Ireland) where pheasants have practically died out, owing to excessive poaching and lack of keeping and management. Introduction of pheasants would be of no value, as long as the situation remained unchanged.

c. Pheasant poults from game farms cost 16/- to 20/- each, according to age.

SATURDAY, 12 OCTOBER

PSYCHOLOGISCHE PROBLEME BEIM AUSSETZEN VON  
FASANEN UND REBHÜHNERN

Dr. *Harry Frank*

Forschungsstelle für Jagdkunde, Bonn.

Die Beringungsergebnisse bei Fasanen zeigten, daß ein verschwindend geringer Prozentsatz von beringten Fasanen geschossen wird. Auch der Prozentsatz der als gerissen oder geschlagen zurückgemeldeten Tiere ist außerordentlich gering.

Diese merkwürdige Tatsache wird darauf zurückgeführt, daß die in Fasanerien aufgezogenen Fasanen nicht gelernt haben, sich mit der Umwelt auseinanderzusetzen. Sie kennen die natürlichen Feinde nicht, denn nur ein Teil der Reaktionen auf bestimmte Feindschemata scheinen angeboren zu sein. Andererseits wird der Mensch von aufgezogenen Fasanen nicht als Feind betrachtet, so daß ein Zuzug zu Bauernhöfen erfolgt, auf denen die Fasanen eingefangen und getötet werden. Jedenfalls erscheinen dem Vortragenden diese beiden Möglichkeiten die einzigen Ursachen für das Verschwinden beringter Fasanen zu sein.

In Bezug auf Rebhühner liegen keine Beringungsergebnisse vor, aber auch hier zeigen angestellte Versuche, daß aufgezogene Rebhühner, die durch keine Glucke gelernt haben, „Freund von Feind zu unterscheiden“, der freien Wildbahn hilflos gegenüberstehen.

Der günstigste Zeitpunkt des Aussetzens wird zur Diskussion gestellt. Der Vortragende ist der Ansicht, daß frühzeitige Adoption bei Rebhühnern die günstigsten Erfolge zeitigen wird.

DISCUSSION:

LEONHARD: Wurden die Fasanen ausgesetzt in Revieren mit Fasanenbesatz oder waren die Reviere ohne Fasanen?

FRANK: Die Fasanen wurden in Revieren mit Fasanenbesatz ausgesetzt.

PALUDAN: Wie alt waren die ausgesetzten Fasanen? War die Jagd frei dort, wo die Fasanen ausgesetzt wurden, oder hatte man die Jagd die erste Jagdsaison beschränkt?

FRANK: Es wurden erwachsene Fasänen ausgesetzt z.T. vor der Jagd und z.T. im Frühjahr. Die Jagd war nicht beschränkt und dennoch wurden keine beringten Fasänen geschossen.

KATZENMEIER: Passen helle gezüchtete Fasänen beim Erscheinen von Raubvögeln besser auf?

FRANK: Darüber liegen keine Beobachtungen vor.

THAMDRUP: Hat Dr. Frank versucht, denselben Versuch mit "wildem" Vögel zu machen?

FRANK: Es wurden auch Wildfänge ausgesetzt, aber ein Teil dieser Wildfänge stammte aus Fasanerien (also zahme Fasänen), das stellte sich aber erst später heraus. Garantiert reine Wildfänge zu bekommen ist schwer, wenn man sie nicht selber fängt.

VALENTINCIC: Ich führe ein Beispiel an, das die Ausführungen von Dr. Frank bestätigt:

Ein Jagdverband in meinem Lande (Slovenia) hat 200 Tenebrosus-Fasänen ausgesetzt, dort waren auch einheimische Colchicus- und Mongolicus-Fasänen. In Jahren, die der Aussetzung folgten, wurde kein einziges Stück geschossen.

Außerdem übe ich auch die Beringungen aus. Ich benütze die Beinringe, die mir eine ornithologische Station liefert. Doch höre ich öfters von Jägern den Vorwurf, daß die Ringe schwach sind, "weil so wenige beringte Fasänen geschossen werden". Wahrscheinlich ist doch, daß die Fasänen nicht die Ringe verloren haben, sondern daß die Fasänen verloren gegangen sind.

BEHNKE: Beringte Hähne wurden nicht geschossen, aber später zu 50% gefangen. – Anlernen der in Wildfasanerien gezogenen Fasänen durch einen Puter, der selbst ein Gesperre führt und auf den Aufzuchtsgelände frei läuft.

JACZEWSKI: Es ist ein allgemeines Problem. Ähnliche Beispiele haben wir nicht nur bei Vögeln, aber auch bei Säugetieren, zum Beispiel bei Hirschen, Wisenten usw. – Wenn man ein Wildtier in Gefangenschaft aufgezüchtet hat und dann aussetzt, dann ist es kein wildes Tier mehr. Diese Tiere haben keine Angst vor den Menschen, Raubtieren usw., wie z.B. Hirsche in dem Tiergarten in Kopenhagen.

VALENTINCIC: Zur Frage, ob es sich überhaupt das Wild – vor allem Rebhuhn und Fasan – künstlich zu züchten lohnt, meine ich, daß diese Frage untersucht werden soll, denn auch mir ist ein Beispiel bekannt (Murska Sobola), wo von 200 ausgesetzten Tenebrosus-Fasänen kein abgeschossen wurde. Doch meine ich, wo man das Wild haben will, und die Lebensbedingungen dafür geeignet sind (vielleicht gab es auch in Geschichte dort), dürfen wir nicht auf den Preis des Einzelstücks sehen. Das wichtigste ist, daß wir dort dieses Wild nach gewisser Periode wieder natürlich haben werden.

FRANK: Meiner Ansicht nach können wir auf künstliche Züchtung nicht verzichten. Besonders nach Katastrophen-Jahren ist es erforderlich.

In einzelnen Teilen Deutschlands sind durch die letzten schlechten Jahre fast alle Rebhühner verschwunden. Hier tut schnelle Hilfe not.

SATURDAY, 12 OCTOBER

SOME RESULTS OF MARKING EXPERIMENTS ON PHEASANTS  
FROM A DANISH ESTATE (KALØ)

*Knud Paludan*

Danish Game Research Station, Kalo pr. Rønde

Marking of pheasants and partridges has been carried out by the Danish Game Biology Station since 1949. This account presents the results obtained through marking of all pheasants released on the Estate of Kalø.

*Adult birds.*

During the winters of 1950-53 pheasants were captured. Some were used for stocking purposes elsewhere while others were penned during the subsequent laying season and released in early June. The material of released and ringed birds totals 151 cocks and 1077 hens. Per 100 birds released 33, 9, 2, and 0 cocks and 38, 17, 8, and 3 hens were recaptured during the four next following winters. The recaptures reflect a proportionate reduction of the initial population of released birds and indicate a mean annual mortality of 75 per cent in males and 58 per cent in females.

During the years following the release 44 per cent of the males and 28 per cent of the females were removed from the population by shooting or trapping. The remainder died through other causes. Had all the recaptured birds been removed immediately—instead of releasing some of them again—the percentage utilization would have reached 53 and 51 in males and females respectively.

*Chicks released.*

In 1950, 51 and 52 a total of 2034 chicks were marked and, when appr. 6 weeks old, released with foster-mothers in the wood. Per 100 chicks marked 15, 6, 3, and 2 were recaptured during the next following four winters. This is equivalent to a mean annual mortality of appr. 58 per cent. 15.4 per cent of the released birds were harvested but another 6 per cent could have been obtained had all the captured birds been removed from the population immediately. On comparing the recapture rate of released adults and chicks it was found that in all

probability  $\frac{1}{2}$ - $\frac{2}{3}$  of the one-week chicks and  $\frac{1}{3}$ - $\frac{1}{2}$  of the eight-week chicks were lost before the first season.

Improved returns were obtained (1953) by rearing the chicks in artificial brooders within a fenced area which they were at will to leave by 8-9 weeks' age. Using this method 31 per cent were recaptured during the first season as opposed to 14-18 per cent in the three preceding years.

In 1952 308 brooder-reared chicks were, at an age of 12 weeks, released directly from the pen into the wood. Although at least 18 fell victims to a fox during the first or second night 44 per cent were recaptured during the next following two years. Among 634 one-week-old chicks released with foster-mothers the same year only 19 per cent were recaptured.

An experiment carried out in 1956 showed that brooder-reared chicks must be at least 11-12 weeks old on release. Chicks aged  $8\frac{1}{2}$  weeks showed a recovery percentage of only 32 during the first season while it was 55 and 58 in chicks aged 11 and 13 weeks, the releases being made simultaneously and in the same area.

#### *Conclusions.*

The practical conclusions to be drawn from these experiments can perhaps best be expressed as follows:

1. The rapid population turnover in conjunction with the large discrepancy between actual and theoretical utilization show that the population increment must be harvested as soon as possible.
2. Release of chicks with foster-mothers gave very poor returns.
3. Since improved results were obtained by brooder-reared chicks this method of release is recommended.
4. Brooder-reared chicks to be released in a new environment should be at least 11-12 weeks old on release.
5. In view of the rather low percentage utilization of released birds the price per bird harvested will necessarily remain fairly high.

#### DISCUSSION:

THAMDRUP: 1) Stellt eine fundamentale Frage: Wird es sich lohnen, wenn erst die Fasanen sich in einem Lande eingebürgert haben, damit fortzusetzen, das Aussetzen mit öffentlichen Mitteln durchzuführen. Private Revierinhaber, die die Kosten tragen wollen, können es tun. Hier in Dänemark hat man gefunden, daß allgemeine Fasanenaussetzungen für Jagdfondsmittel aufhören müssen. Man muß durch andere Mittel (Schonzeiten, Habitatverbesserungen etc.) versuchen, den Fasanenbestand in freier Wildbahn aufrechtzuerhalten.

2) Untersuchungen von Paludan zeigen, daß man im Juli–August 42 Rebhühner-Küicken aussetzen muß, um nächstes Jahr eben vor der Jagdzeit noch 2 Vögel zurückzuhaben. Wenn wir wissen, daß die Rebhühner-Küicken je etwa 10 dän. Kr. kosten, muß man sagen, daß die 2 Vögel, die man nächstes Jahr bekommen kann, ziemlich teuer werden.

Können wir als Wildbiologen so was empfehlen? Natürlicherweise, Aussetzen ist notwendig, um neue Arten einzuführen, aber für die Aufrechterhaltung eines Bestands im Lande als Ganzes ist es wohl kaum möglich. Die Mittel dafür werden all zu groß.

COLES: How were the brooder-reared pheasants released? Any conditioning or penning.

PALUDAN: The pheasants were released without any conditioning or penning. They were taken directly from the game farm and released.

COLES: Was the shooting—walking or driving?

PALUDAN: The shooting was done by beating the area; the most common way of pheasant hunting in Denmark.

BLANK: Was the wild pheasant populations at varying density during the years when the releases were made? Did the larger number in the hen-reared release group contribute to the bigger loss?

PALUDAN: During the experimental years no real census of the wild pheasant population was undertaken.

EVERS: Possible to draw conclusion on nature of mortality of chicks between 8 and 10 weeks?

PALUDAN: The percentage coming in our hands of the chickens dying is so small that I think it is not possible to draw conclusions on the general nature of the mortality.

The above paper of dr. Paludan is printed in entirety in "DANISH REVIEW OF GAME BIOLOGY" vol. 3 part. 3 1958.

MONDAY, 14 OCTOBER

9,00 Chairman: C. L. Coles. Secretary: K. Paludan.

FACTORS CONTROLLING BROOD SIZE IN THE PARTRIDGE (*PERDIX PERDIX*) ON AN ESTATE IN SOUTH ENGLAND

*T. H. Blank and J. S. Ash*

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Measurements of the partridge population on a 4,000 acre game research station have been made from 1949—1957. Pre-hatching data (pair density, clutch size, hatchability and nesting success) followed by average brood size at the beginning of August (when young birds are approximately 6-weeks old) have been collected: attempts to measure some of the more important post-hatching factors controlling brood-size have also been made. The marking of large numbers of parent birds, so that the breeding success of individual pairs can be followed through the whole season, has considerably facilitated this study.

Clutch size, hatchability and nesting success have each shown some variation over the eight-year period, but when condensed into an index representing the average number of chicks hatched per pair, the figure has been remarkably constant— $10 \pm 1$  (except for 1953 when the figure was 11.7). The average brood size per adult pair six weeks after hatching has, however, varied from 1.1 to 8.5, and there appears to be little correlation between the pre-hatching factors and brood size of 6-week old birds. Post-hatching factors—e.g. weather, grass-cutting, predators, and possibly disease—appear to be of greatest importance in determining ultimate brood size. Unfortunately, some of these factors are not susceptible to quantitative measurement, and the assessment of their importance is further complicated by the way they interact.

Weather during the first few weeks after hatching appears to be the main factor controlling the size of 6-week old broods. Combination of low day temperatures (below 60° F.), lack of sunshine and persistent damp conditions, result in very low survival rates (e.g. 1953 and 1954). At the other extreme, a period of dry, warm sunny days produced the largest recorded average brood size (1949). Although the mode of action of bad weather conditions is assumed to be direct, it is possible that food may not be as readily available under these conditions.



(No suitable method for measuring the availability of partridge chick food has been developed). There is some annual variation in the times of peak grass-cutting and hatching. Chick losses are not necessarily directly proportionate to acreage of grass cut, because grass-cutting that takes place after the peak hatching period, or prolonged hay-making due to bad weather, causes more serious losses. Although no directly harmful sprays have so far been used on the area studied, hormone weedkillers used on cornfields may indirectly increase grass-cutting losses, since unsprayed grass fields may be made relatively more attractive to partridges with chicks.

Predation on an area where predators are as far as possible controlled, has only a limited effect on brood size, and this is likely to be fairly constant over the 8-years period. In 1949, when weather and grass-cutting together did little to reduce brood size, the maximum possible post-hatching effect of predation appears to have been to reduce brood size from 10.2 to 8.5.

Disease is not believed to have appreciably reduced brood size. There has been an increase in gapeworm infection in young birds (in October and November) on certain areas of the estate, but brood size in these areas does not appear to have been affected.

Although brood size (at hatching) is not affected by density of breeding pairs, there is an apparent correlation between density and brood size at six weeks. Bad post-hatching weather and high grass-cutting acreage, however, happen to occur in years of high breeding density, and the correlation may be partly coincidental, although high breeding density does result in increased nests being located where, although hatching successfully, chances of rearing young are very small.

#### DISCUSSION:

THOMPSON: 1) Why is it not possible to mark partridge chicks, as well as old birds; have you tried leg rings?

BLANK: Leg-rings cannot be used on young partridges less than 5 to 6 weeks old because they would not stay on if allowance for subsequent growth is made.

THOMPSON: 2) You said that predators on the I.C.I. estate were longely controlled. How much control of foxes, for example, is actually practised, and have you any measure of fox predation on partridges—does it fluctuate greatly from year to year?

BLANK: Predation by foxes on partridges mainly affects the sitting hen and each year we have lost between 10 and 15 known nests. Foxes are reduced to the minimum just before the beginning of the nesting season.

FRANK: Sind 1953 viele Jungtiere gefunden, und wie war das Ergebnis des P.M.?

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BLANK: Even when large numbers of partridge chicks are dying, only a few are found suitable for P.M.-examination; apart from lung-congestion in some cases, cause of death could not be determined.

WEBB: 1) Is egg predation a desirable factor for a partridge population since such predation will cause re-nesting and thus spread peak periods of hatching, which in some years may coincide with unfavourable weather.

BLANK: Hatch-spreading resulting from some egg-predation may be desirable in some years. Even where predators are controlled there are usually sufficient egg-thieves to ensure this takes place. Hatch-spreading trials, by deliberately removing eggs from selected early nests, were made in 1954 but the bad weather throughout the June and July of that year prevented the demonstration of any resulting advantages.

HARDENBERG: 1) How do you estimate the amount of losses in broods by predators, in other words, how is your technique (the post hatching effect of predation)?

BLANK: We cannot estimate chick loss to predators in most years. In 1949 only, when chick-loss due to weather conditions is believed to have been negligible, the total loss from hatching to 6 weeks old appears to have been only 1.7 chicks per brood. This includes losses through various accidental causes, but suggests that loss from predators, on an area where predators are controlled, is not a factor responsible for the large fluctuations in chick-survival.

EVERS: 1) The lecture has shown interesting correlations between the brood survival and adverse weather. Since the weather in England has been broadly the same over the last 50 years whereas the partridge population has fallen steeply, may there not be some factor which makes the partridge chick more susceptible to adverse weather?

BLANK: Although the climate may not have changed in the last 50 years we have recently experienced an unusual sequence of bad weather during the breeding seasons. Over large areas the partridge habitat has deteriorated, but I do not think there is any factor inherent in the partridge which makes the chick less viable. Where the habitat is good, and when the weather is cooperative, high production rates are still obtained.

EYGENRAAM: 2) I was surprised to see that for the computation of the average clutch size you have included a number of nests from which you removed eggs; why didn't you leave them out of consideration?

BLANK: In the case mentioned the figures represented the average clutch size in all known nests that were successfully incubated. The removal of eggs, whether by human or animal egg thieves has to be taken into account.

TILGNER: 1) I wish to congratulate Messrs. Blank and Ash for their very valuable observations. Did you find out how long the chickens can resist hunger or exposure to wet and cold weather (below 16°C)? It is a physiological observation which might easily be conducted in a laboratory, but the results would be valuable for your empirical conclusions.

BLANK: No, I am afraid we have not yet carried out these tests under laboratory control but I understand that work being done on Capercaillie chicks in Sweden has already produced some very interesting results.

MONDAY, 14 OCTOBER

THE PROBLEM OF THE SHORT-TERM FLUCTUATIONS IN  
NUMBERS OF TETRAONIDS IN EUROPE

*L. Siivonen*

Finnish Game Research Institute, Helsinki

This paper was given at the Congress by M. Helminen.

The present study is mainly based on a continuous series of data, comprising the whole of Finland, on the reproduction, breeding phenology etc. of tetraonids. This series was started by the author at the Game Research Institute in 1946. The seasonal and regional fluctuation in the weight and food of the tetraonids as well as the climatic conditions, e. g. the large-scale circulation of atmosphere have served as additional points of comparison. The study prompts the following preliminary conclusions.

The fluctuation in numbers of the autumn tetraonid populations in a form characteristic for the northernmost regions is a problem centered in the female.

The fluctuation is ultimately based on the winter nutritive conditions, on the shifting of the birds for the winter to a special winter diet of poorer nutritive value. The more extreme these conditions of any area are the more the birds lose weight (condition) during the winter.

The immediate cause of the fluctuation is the spring diet (snowless spots = early green plants available on the ground) of the females. This diet is decisive for the restoring of the condition of the hens, indispensable for the success of the reproduction process (females being aroused to egg-laying, the fertility of eggs, clutch size, the quality of eggs, the hatching, condition and mortality of the young etc.) and is reflected in this way in the autumn populations.

The early spring diet is connected with the temperature of a certain narrow period preceding the laying season (preliminary period; under Finnish conditions, primarily April). Due e. g. to the long development of the individual, the variations of this period follow only viscously those of the spring.

The fluctuation thus arising becomes steeper and shorter in "cycle"-length towards the north (extreme wintering conditions), as the weight-losing during the winter, the problem of the early green plants and the success of the reproduction process connected with this diet become more and more critical, the

need of nourishment in the early spring grows (the fattening preceding the egg-laying season requires by females an increase in weight of even 20 %), and the preliminary period (period of the "fattening") becomes increasingly shorter (closer to the winter), more resistant to change and, at the same time, more and more subject to weather changes.

In the south (in milder wintering conditions) the fluctuation thus originating is, for opposite reasons, flatter and longer in "cycle"-length. Accordingly, other factors affecting the size of populations, e. g. the problem of wintering, may also contribute here to determining the course of the fluctuation, even its timing. In the northernmost regions (in the extreme wintering conditions), on the other hand, the other factors (e. g. the influence of the weather during the other stages of the breeding process) seem only to be able to either steepen or to flatten the fluctuation, basically regulated by the problem of the early green plants.

The individual variation of the breeding phenology seems to form a mechanism through which the populations secure at least a partial success for the reproduction process even in conditions typical of decrease years.

The results reached would seem to explain the fluctuation in numbers of the tetraonids in Finland, at least for a period of about 70 years back. Due to the slow changes of the large-scale circulation of atmosphere, a  $\pm$  remarkable synchronism can be observed in the fluctuation in numbers of the European tetraonid populations and even in the fluctuation of many other wintering animal species (e. g. northern small rodents), and perhaps in the seed crops of certain trees and other plants.

On the basis of these results, it has been possible to arrange by gallinaceous birds artificially, in pen-breeding conditions, reproduction processes typical of both an increase and a decrease year.

The results reached form a basis for preventing or at least lessening in the field tetraonid decreases brought about in the way explained. This can be done by artificially clearing snow, especially in early springs of decrease years, to form areas (snowless spots) with natural or sown, frost-resistant early green plants, i. e. by speeding up and furthering artificially the appearing of early green plants in the display and nesting areas of tetraonids.

A forecast of the autumn tetraonid populations can now be drawn up immediately after the climatic conditions (phenology of the early green plants) of the preliminary period (period preceding the egg-laying) are known.

DISCUSSION:

BLANK: 1) How is the production rate of the Tetraonids assessed?

HELMINEN: It is made by comparing the total autumn populations of successive years. E. g. if there is an increase in the population, it means that the reproduction has been successful.

BLANK: 2) Have "good" spring weather conditions been followed by bad "summer" weather—if so what has been the effect?

HELMINEN: Regrettably I do not know the meteorological values of different years, but it seems quite evident that if it has happened, or will happen, the young birds are able to survive the bad weather period according to their physiological condition. If the female bird has got enough green plants during the pre-laying period, the condition of the chicks is good, and vice versa.

HAGEN: I feel the reasoning of Dr. Siivonen to cover the truth very well with regard to the influence of the nutritional conditions in winter and spring on the clutch-size and on the vitality of the chicks hatched. The variation in the clutch-size is, however, small, and mostly also the result of hatching, owing to vitality of the eggs varies comparatively slightly. There are, however, other factor complexes working, especially under the extreme conditions of the high North, and these are present in the environment: The predator-prey factor, the effect of which oscillates according to the well-known rodent cycle. This has a much greater influence on the reproduction in Tetraonidae, and we think this predator-prey relation to be much more responsible for the great differences which occur from year to year in the final result of reproduction. When the predator-prey relation is unfavourable for the game, the main part of the chick-population is wiped out. This should be thought to take place regardless of the vitality which the chicks possess, when having passed their first critical days. Now, the problem is puzzled by the fact that a high production of small rodents—which may also be caused by a good vegetation in the spring, and which offers the game-birds a good protection from the predators—are largely occurring in the same years as when we have a good production of Tetraonide game. Hence the mechanism causing good or bad years for Tetraonide game-birds can be explained in different ways, without at present being able to say what is nearest to the truth.

HELMINEN: So far as I understand Dr. Siivonen gives a secondary value to those factors as that mentioned by Dr. Hagen. They are able to steepen or flatten the fluctuation, which is primarily regulated by the weather conditions during the pre-laying period.

HAGEN: 2) Have experiments been made in Finland regarding artificially established snow-bare patches and sowing of early-green plants in the spring?

HELMINEN: We have made some experiments during a couple of years. We have sowed lampblack and some other black substances on the snow. As early green plants we have used rye as well as some wild plants. More extensive experiments will be made during next spring.

MONDAY, 14 OCTOBER

14,00 Chairman: Harry Frank. Secretary: K. Paludan.

AN INVESTIGATION OF THE FOOD OF SWANS  
AND DUCKS IN DENMARK

*R. Spärck,*

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The population of the Mute Swan has increased considerably during the last 30 years. From 1926 to 1954 the number of breeding pairs in Denmark has increased from 3 or 4 to about 750. A count from the air of wintering swans in 1955 gave the result that about 6000 wintering swans were found round Zealand, of these about 90 % Mute Swans, and about 10 % Whooper Swans. Some people have had the impression that the increase of the population of swans should be harmful to the fishery. An investigation of the stomachs of the swans has therefore been made, the material consisting of 73 Mute Swans shot in the period from October 1956 to June 1957, 9 Whooper Swans, shot in the period from October 1956 to April 1957, and 11 Bewick Swans shot in the period from April 1956 to March 1957.

Of the Mute Swans 6 were without contents in the stomachs. The occurrence of food-items in the rest of them was as follows:

<i>Ruppia spiralis</i> . . . . .	39	stomachs, i. e. an occurrence in	60	%
<i>Potamogeton pectinatus</i> . . . . .	16	— — — —	25	%
<i>Zostera marina</i> . . . . .	11	— — — —	18	%
<i>Chara aspera</i> or <i>baltica</i> . . . . .	14	— — — —	20	%
<i>Zostera hornemanni</i> . . . . .	8	— — — —	12	%
<i>Zannichellia pedunculata</i> . . . . .	7	— — — —	10	%
<i>Scirpus maritimus</i> . . . . .	2	— — — —	3	%
<i>Ceramium</i> sp. . . . .	2	— — — —	3	%
<i>Enteromorpha</i> sp. . . . .	1	— — — —	1½	%

Remains of animal food were not found at all. In a few stomachs a *Mytilus* and a *Cardium* were found, together with some crustaceans (*Idothea*, *Sphaeroma*) which have undoubtedly by accident been swallowed together with the plants. Shrimps were not found at all. From this it can be proved that the Mute Swans

in the Danish waters chiefly feed on leaves, stalks, rhizomes and seeds of aquatic plants, preferably *Ruppia*, *Potamogeton* and *Chara* which in numerous cases made up till about 95 % of the stomach contents. It can thus be stated that Mute Swans exclusively feed on vegetable food.

As far as the two other species are concerned the picture is almost the same. Of the 11 examined Bewick Swans three were empty, three only contained *Zostera*, rhizomes and roots, while five contained only *Potamogeton*. Of the Whooper Swans three contained *Zostera*, one *Potamogeton*, two *Ruppia*, while three had roots of *Dicotyledones* and consequently must have foraged on land.

A material of Mallards (148), Teals (194), Pintails (48), Garganeys (8), Wigeons (80) and Shovelers (52) has been investigated as regards the stomach content. The result is shown in the following table, in which the occurrence of the different food items in each species is given as a percentage of the stomachs investigated:

	Seeds	Grass & leaves	Animal food
Mallards ( <i>Anas platyrhynchos</i> ) . . . . .	96 %	22 %	27 %
Teals ( <i>Anas crecca</i> ) . . . . .	96 %	5 %	18 %
Pintails ( <i>Anas acuta</i> ) . . . . .	90 %	25 %	23 %
Garganeys ( <i>Anas querquedula</i> ) . . . . .	100 %	13 %	75 %
Wigeons ( <i>Anas penelope</i> ) . . . . .	30 %	88 %	13 %
Shovelers ( <i>Anas clypeata</i> ) . . . . .	75 %	17 %	87 %

It is obvious that the Shoveler differs from other Anatinae by the large per cent of animal food (mainly small molluscs and crustaceans). The Wigeon is characterized by the large quantities of grass in the stomach. In the other species seeds, especially from *Scirpus*, *Potamogeton* and *Heleocharis* are the most important food items, in the Teal also seeds from *Suaeda* (found in 31 % — in a single stomach 50.000 seeds were found). In Pintail seeds from *Ruppia* are of a certain importance (found in 27 %).

#### DISCUSSION:

JACZEWSKI: I want to ask about the question of food substitution in these birds. To what extent the natural food can be substituted by artificial food.

Another question is what kinds of foods are preferred by these birds, when the natural food is lacking. And what kinds of food are preferred when the most common food is lacking.

SPÄRCK: The task of our investigations was to state the preferable food under natural conditions, so we had shown little attention to the problem of substitutional food. In our material we have astonishingly little of that kind.

MÜLLER-USING: In Deutschland ist bei den Stockenten in August eine deutliche Bevorzugung bestimmter Getreidesorten feststellbar, insbesondere wird Gerste bevorzugt, danach Weizen und Hafer, während Roggen weniger gern genommen wird. Ist diese Rangfolge in Dänemark nach Ihren Forschungen dieselbe?

SPÄRCK: Wir haben ganz dieselbe Rangfolge bei unseren Stockenten konstatiert, und nicht nur bei den Enten, sondern auch bei Fasanen und Rebhühnern.

BLANK: I very much appreciated professor Spärcks clear disposition, and I would like to ask if the crop contents were collected throughout the period October to June or whether they came mainly from one or two months only?

SPÄRCK: The material has been collected evenly through the year, except from the months July-September. Also the material of stomachs of swimming ducks is evenly distributed through the year. The material of diving ducks is mainly from wintering birds, as most of the species are northern or arctic.



MONDAY, 14 OCTOBER

## A REVIEW OF WILDFOWL RESEARCH IN BRITAIN

*G. V. T. Matthews*

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In Britain research work on conservation problems connected with wildfowl is largely delegated by the Government body concerned, the Nature Conservancy, to an independent organisation, the Wildfowl Trust. Much useful supplementary research is done by individual amateurs.

The research aims at studying and measuring wildfowl populations and the investigation of all the factors governing their fluctuations. One approach is by direct census of a sample of habitats; the ducks on more than eight hundred waters are now counted each year, the majority at regular monthly intervals. Besides the detection of long term trends, this results in the accumulation of much general ecological information. This is being used to draw up a general review of wildfowl concentrations and habitats which will enable the optimal siting of wildfowl refuges. This study will be developed into a thorough-going habitat investigation.

The population of one species, the Pink-footed Goose, has been measured over a number of years by the capture-recapture technique. Some seventeen thousand birds have been caught either in Iceland when flightless or in Britain during autumn and winter by means of rocket-propelled nets. Ducks are ringed at the rate of about five thousand a year at four duck decoys and one cage-trap centre. Post fledging mortality rates and their variation with age and sex are derived from this source as well as information on migration. Work on general breeding biology and juvenile mortality rates is necessarily limited since few species breed in Britain in any number.

The importance of food as a controlling factor is being closely studied. Examination of stomachs from shot birds indicates the food taken and, where possible, this is related to the food available on the ground. An intensive study area has been set up in S.E. England. The distribution of *Zostera* has received special attention. These studies are forming the basis for developments in methods of improvement and management of areas for the benefit of wildfowl. Some intensive work is also done on the nutrition of wildfowl in captivity.

Little is known of the importance of disease and parasites as controlling factors. A considerable amount of information on general pathology is being gained by post-mortem examination of birds dying in captivity; the viscera from shot birds are examined for parasites, likewise the blood of birds trapped for ringing. A complete review of published work on the parasites of wildfowl is being drawn up as a card reference index. One disease, *Aspergillosis*, is being studied in detail.

Considerable strides have been made in aviculture when building up two large collections of wildfowl, with living representatives of about 140 species and sub-species. This knowledge has been used to save one species, the Hawaiian Goose, from extinction and can be used in other cases where the species have declined beyond the reach of normal conservation measures. The collections are also used for work on ethology and taxonomy. Excellent observational facilities assist the study of a large wintering flock of White-fronted Geese.

#### DISCUSSION:

EVGENRAAM: The main problem is whether there is a trend increase or decrease in the numbers of waterfowls, and this can only be solved in a long term research. As the counts in the Netherlands have not started before 1948 the data collected have not yet been worked out. We are not interested in analyses of the data concerning a certain species over a short period, say 3 years.

I should like to ask Mr. Matthews whether he is of the opinion that waterfowl counts have any value with regard to solving the problem, unless they are carried out during a number of years.

MATTHEWS: I entirely agree that the full value of the counts will only become apparant over a long period. My point was that continued accumulation of poor data will not result in it becoming good data. We should therefore make such investigations of the data as are possible over shorter periods to satisfy ourselves that it is worth continuing and whether improvements can be made.

TILGNER: The topics of research are very interesting and would be still more valuable if we could get acquainted with the results. Since when are the investigations carried on and when are the data obtainable?

MATTHEWS: Replied that he had said he was dealing with projects just beginning or still in progress. Reports on earlier work, which data from 1959 may be found in:

The Wildfowl Trust Annual Reports, National Wildfowl Count Reports (four issued since 1948), Journal of Animal Ecology, Journal of Behaviour, Ibis, British Birds, Bird Study, Dansk Ornith. For. Tidsskr., Proceedings 6th Technical Meeting I.U.C.N., Proceedings North American Wildlife Conference.

MONDAY, 14 OCTOBER

CO-OPERATION IN WATERFOWL RESEARCH IN NORTHERN  
AND WESTERN EUROPE

*Pekka Grenquist*

Finnish Game Research Institute, Helsinki

During the third Nordic Game Biologist Meeting at Kalö in Denmark in the autumn of 1956 a proposal on co-operation in waterfowl research was put forward by the Finns. During the subsequent discussion it was agreed that Denmark, Norway and Sweden would submit in the early spring 1957 to the Finnish Game Research Institute in Helsinki their own clear proposals on co-operation. This has in fact been done, but the Swedish Game Research Council has suggested that practical steps should be postponed, until the results of the Nordic Hunters' Congress in July 1957 in Sweden were known.

At the fourth meeting of the Nordic game researchers at Söderhamn in June 1957, immediately before the Hunters' Congress in Stockholm, it was decided that Finland, after receiving a supplementary report from the Swedish Game Research Council, should collocate the proposals of the Nordic countries on co-operation in scientific research and should produce an account of what has been planned or put into effect in the different countries. The intention was to introduce this report at the Third Congress of the International Union of Game Biologists in Denmark in autumn, 1957, an appropriate occasion for emphasising the interest of the Nordic countries in further extended international co-operation in waterfowl research.

The points accepted by all countries in the discussions at Kalö and Söderhamn and in the written suggestions are briefly as follows:

1. The co-operation should for the present apply to research work on the Anatidae, i.e. ducks, mergansers, geese and swans.
2. Co-operation should lead to the intensification of birdbanding work and of the research tasks arising from the refinding of the birds.
3. Research must be directed also to joint species; first and foremost the mallard and possibly the eider would be suitable subjects to start with.

4. Information on research work must be continuously exchanged between the Nordic countries.

When the Finnish recommendation on co-operation in research on the Anatidae was put forward in autumn 1956, the main thought was that the ducks were breeding in the Nordic countries and also either migrated or spent the winter in the regions around the Baltic and North Sea. As migration largely takes place in a south-west direction, it is only natural that research on the Anatidae, in fact already under way, should in Finland be concentrated chiefly on breeding and biological research into reproduction, in Sweden on migration as well, and in Denmark also on winter quarter biology.

Each country has its own more or less specific species. Thus, Denmark and Sweden have investigated geese and swans, Finland goldeneye and velvet scoter.

It is, thus, clear that a certain natural division of labour already exists in the field of research. In co-operating in research like that into the biology of the Anatidae, it is obvious that each member country follows its own national line, determined by the importance of the fowl species for hunting, by actual research needs, availability of the necessary economic and organisational prerequisites and last but not least by the researchers' interest in the problems in question. Co-operation of this type entailing a natural division of labour should lead to excellent results. In co-operation it is important not to shackle national research, which must be able to follow its own line, but, on the other hand, efforts should be made to avoid unnecessary work through passing on information on each country's research projects.

Owing to the fact that not only the Anatidae species but even individual birds are common to the countries round the Baltic and North Sea, a division of labour based only on species or on different problems in the biology of one and the same species is not sufficient. There are also problems where a proper co-ordination of the whole work along the same lines is necessary. A problem of this type is the question of the migration of the Anatidae and all that is associated with it. Some countries have emphasized the importance of co-ordinating certain biological reproduction investigations. Joint discussions should reveal suitable forms of work.

It is suggested in accordance with the decision of the Nordic game researchers at Kalö and Söderhamn that investigators interested in waterfowl research, especially in the Baltic and North Sea countries should discuss the following problems:

- (1) A practical plan for co-ordinated waterfowl research in the Baltic and North Sea countries;
- (2) An intensification of the birdbanding activity;

- (3) The formulation of correlated investigations on production biological;
- (4) The participation of the Nordic countries in the international wildfowl inquiry;
- (5) Other suggestions made by the Nordic countries;
- (6) Information.

DISCUSSION:

EYGENRAAM: Is there any evidence about a difference in recovery percentage between ducks wingmarked and ducks ringed?

I am afraid that the percentage of recovery, which is about 16% for ringed mallard in the Netherlands as it is in Great Britain, will not be reached with wingmarked birds. Wingmarks are easily overlooked.

I am interested to hear about Mr. Grenquist's experiences.

GRENQUIST: In Finland there is no evidence of clear difference in the recovery percentage of ducks wing- or ringmarked. The recovery percentage for wingmarked mallards is 14, and for ringmarked 13.

MATTHEWS: Stated that he agreed profoundly with Mr. Grenquist on the need for co-operation in wildfowl research and exchange of information, particularly within regional groups having a biological reality. He suggested that the appropriate area in this case should extend from North Russia through the Baltic countries to the Netherlands and the British Isles—the N.W. Europe "Flyway" to borrow a useful American term.

He explained that the International Wildfowl Inquiry had ceased some three years ago and been replaced by the International Wildfowl Research Bureau. This had not proved a very powerful instrument. The Bureau, which had previously not admitted the Nordic countries (other than Denmark), on the grounds that they did not carry out the "Wildfowl Counts" in the winter half of the year. At their last meeting (in Bulawayo, S. Rhodesia) the Bureau had not agreed with a suggestion that their limited resources should be concentrated on the European theatre.

He suggested that, an informal N. W. Europe Flyway study group, composed of those actively working on the Anatidae would be more useful than any more committees. He hoped that Mr. Grenquist would be able to undertake such secretarial duties as might arise.

He concluded by again emphasising how vital it was that USSR should eventually join any such arrangement.

THAMDRUP: Schlägt vor, daß man bei dieser Gelegenheit versucht, die Wissenschaftler zu vereinigen, die sich mit den Entenproblemen beschäftigen.

TILGNER: Is there a correlation between the quantitative fluctuations and the quality of the waterfowl, or are you, for the time being, mainly concentrated upon quantitative problems?

GRENQUIST: Quantitative studies on ducks have been carried out only in the archipelago on the diving ducks and the correlation between the quantitative fluctuations and the quality of the ducks has not been investigated.

TUESDAY, 15 OCTOBER

9,00 Chairman: Karl Borg, Secretary: K. Paludan.

DIE ENTWICKLUNG DER GROSSTIERBESTÄNDE IN DEN  
KULTURLANDSCHAFTEN MITTELEUROPAS IM VERLAUF  
DER LETZTEN 100 JAHRE

*D. Müller-Using*

Institut f. Jagdkunde, Hann. Münden, D. B. R.

Die fast allgemein gehegte Ansicht, daß die Kulturlandschaft im Bereiche hochzivilisierter Völker der Erhaltung und Entwicklung der Großtierwelt schlechthin feindlich sei, ist so falsch, daß man eher sagen könnte: Das Umgekehrte ist richtig. Das zeigt, von ganz wenigen Ausnahmen abgesehen, die Bestandesentwicklung bei den einzelnen Arten, die an Hand der jährlichen Streckenberichte in einem großen Teil Österreichs, Deutschlands und anderer mitteleuropäischen Länder dargestellt wird. Bei nahezu allen Arten hat sich eine starke quantitative Vermehrung im Verlauf der letzten 100 Jahre nachweisen lassen, darüber hinaus bei nicht wenigen auch eine qualitative Verbesserung, wie sie im Wildbretgewicht und der Trophäenentwicklung zum Ausdruck kommt. Um nur einige Beispiele herauszugreifen: In den preußischen Staatsforsten, also immerhin in dem größten Teil des deutschen Rotwildgebietes, hat sich zwischen 1865 und 1936 die jährliche Rotwildstrecke nachhaltig auf etwa das Achtfache erhöht, in Bayern zwischen 1865 und 1939 immerhin auf das Fünffache. Gleichfalls verfünffacht hat sich dort die Schwarzwildstrecke in dem genannten Zeitraum, was mit den für Preußen gültigen Zahlen gut übereinstimmt. Etwas mehr schwankten die Damwildbestände in ihrer zahlenmäßigen Stärke, doch ergab die Strecke von 1936 immerhin noch mehr als das Doppelte der Zeit um 1860. Auch nach dem II. Weltkriege ist nun örtlich eine wesentliche Bestandesverminderung aufgetreten, die in vielen Fällen heute schon wieder ausgeglichen ist. Gleichfalls sehr stark vermehrt hat sich das Rehwild, in Bayern wies die Statistik im Jahre 1865 eine Jahresstrecke von 23 500 Stück aus, die Jahre 1936-39 *im Durchschnitt* eine solche von 145 000 Stück, und im Jahre 1954-55 betrug die Jahresstrecke 85 000 Stück, wobei zu berücksichtigen ist, daß die links des Rheins gelegene Pfalz mit einer sehr erheblichen Rehwildstrecke seit 1945 nicht mehr zu Bayern gehört.

Fast auf der gleichen Höhe gehalten hat sich der Jahresabschuß der Gemse in den Bayerischen Alpen, der 1865, ebenso im Durchschnitt der Jahre 1935-39, jeweils rd. 1 000 Stück betrug. Hinzugekommen ist indessen ein vorerst noch geringer Abschuß in dem mit Gemenen neu besiedelten südlichen Schwarzwald (Land Baden-Württemberg). Eine weitere Aussetzung erfolgte 1956 in den französischen Vogesen, sowie, in weiter zurückliegender Zeit, in den Sudeten und im Elbsandsteingebirge. Das Verbreitungsgebiet der Gemse hat sich also in Mitteleuropa gleichfalls ausgedehnt.

Selbst eine so kulturfeindliche Art wie der Elch hat in seinem ostpreußischen Verbreitungsgebiet sich dort, trotz eines starken Rückschlages nach dem ersten Weltkrieges, bis zum Jahre 1943 auf etwa das Hundertfache des kleinen Bestandesrestes von 11 Stück im Jahre 1849 vermehrt. Er ist nach den neuesten Nachrichten auch heute noch in Ostpreußen vorhanden. Bekanntter und besser belegt ist die riesige Zunahme des Elchwildes in Schweden.

Neben der Vermehrung dieser bodenständigen oder vor sehr langer Zeit eingebürgerten Wildarten haben auch neue Einbürgerungen stattgefunden, insbesondere eine solche des Sikawildes, das heute in den meisten europäischen Großstaaten vorkommt, und des Muffelwildes, das auch in den kleineren Staaten Südost- und Mitteleuropas nicht mehr fehlt. Der gegenwärtige Bestand dieser Wildarten in Deutschland beläuft sich nach einer Erhebung Schminckes auf etwa 3 000 Stück (Ersteinbürgerung 1902).

Auch kleine Tierarten, wie z. B. das etwa hasengroße Murmeltier, haben mit Hilfe des Menschen ihr Areal um Zehntausende von Quadratkilometern vergrößert. So sind die österreichischen Bundesländer Kärnten und Steiermark vor 80 Jahren noch vollständig murmeltierfrei gewesen, während heute allein in einem einzigen Verwaltungsbezirk Kärntens ein Bestand von schätzungsweise 6 000 Stück gemeldet würde.

Vermehrt haben sich auch bestimmte Raubvogelarten, in Deutschland besonders der Rote Milan, der Mäusebussard und der Sperber. Der Steinadlerbestand des Alpengebiets hat sich seit dem Tiefstand von 1910 mindestens verfünffacht und ist heute stellenweise sogar übermäßig stark. Auch der Seeadler, der heute wieder in Dänemark brütet, hat sein Verbreitungsgebiet im Küstenraum der Ostsee ausgedehnt und kann nicht unbedingt mehr als eine gefährdete Tierart angesehen werden.

Daneben gibt es aber doch eine große Anzahl von in ihren Bestandesziffern unaufhaltsam zurückgehenden Tierarten, und das sind, ganz im Gegensatz zu den großen Wiederkäuern der freien Wildbahn, vornehmlich die Tiere der Heide und der Moorlandschaften. Diese Landschaften werden fortlaufend der forst- oder landwirtschaftlichen Nutzung zugeführt, und damit verschwindet die

ursprüngliche Vegetation als Grundlage für das diesen Flächen eigentümliche Tierleben. Besonders gefährdet ist das Birkhuhn, aber auch zahlreiche Sumpf- und Wasservogel sind in weiten Teilen ihres Verbreitungsgebietes bereits vollständig verschwunden.

Dennoch ist die Bilanz, aufs Ganze gesehen, in Mitteleuropa positiv, wozu in erster Linie die dem Naturschutzgedanken zugeneigte Jägerei beigetragen hat. Die großen Jagdtiere sind die eindrucksvollsten und jedermann im Volke vertrauten Tiergestalten, und ihre Erhaltung und zunehmende Verbreitung ist gesichert.

#### DISCUSSION:

TILGNER: 1) Wie groß ist die Korrelation zwischen der Vergrößerung der Wildbestände und der Bevölkerungszahl in dem betreffenden Zeitraum?

MÜLLER-USING: Es besteht positive Korrelation.

TILGNER: 2) Was für einen Ausblick kann oder könnte man auf Grund der Bestandesentwicklung des Wildes annehmen, zumal Forschungsergebnisse dauernd unsere Möglichkeiten verbessern. Z.B. beim Menschen rechnen wir eine zweimalige Vergrößerung binnen hundert Jahren, d.h. von ca. 2 Milliarden im 1952, auf 4 Milliarden im 2002 und 8 Milliarden im Jahre 2052, wobei keine Befürchtungen betreffs Lebensmittelmangels zu erwarten sind.

Kann eine Similarität für die Wildprognose und Wilddichte auf Grund der Verbesserung der Wald- und Landproduktion zutreffen?

MÜLLER-USING: Ein weiteres Anwachsen der Großwildbestände in Zentraleuropa halte ich nicht für wahrscheinlich, noch auch für erwünscht, da die Schäden zu groß sind. Den idealistischen Bestrebungen des Naturschutzes ist hinsichtlich der Großwildbestände hinreichend Genüge getan. An sich wäre weitere Vermehrung leicht zu bewirken. Nahrung und Deckung werden durch intensivere Land- und Forstwirtschaft zweifellos verbessert.

GÄBLER: Gemsen in der DDR stammen von den in der CSR ausgesetzten ab. Der von Müller-Using erwähnte Bock steht im Lausitzer Gebirge. Die Ermittlungen über den Mufflonbestand der DDR fasst auf brieflichen Mitteilungen; Herr Richter versucht z.Z. genauere Unterlagen zu bekommen. Seeadler und Schwäne haben in letzter Zeit bei uns, besonders in Mecklenburg, erfreulicherweise zugenommen. Aussetzungen von Tierarten aus anderen Faunengebieten werden auch von uns im wesentlichen abgelehnt. Das geht bereits daraus hervor, daß bei uns dazu die Genehmigung der Obersten Naturschutzbehörde notwendig ist.

BEHNRE: Es sollte bezüglich der Einbürgerung fremder Wildarten bedacht werden, daß unsere Pflanzenwelt aus wirtschaftlichen Gründen schon in ganzen Beständen aus ausländischen Arten zusammengesetzt ist.

Sikawild ist in Schleswig-Holstein zugenommen. In freier Wildbahn in 2 Kreisen ca. 150 Stück.

MÜLLER-USING: In Land- und Forstwirtschaft sind Ertragsfragen maßgebend, bei der Jagd nicht. Dennoch werden auch hier wirtschaftliche Fragen berührt, wie bei der Fasanenaussetzung; aber es gibt auch was anderes. Wo eine "biologische Nische" durch eine geeignete Nutzwildart ausgefüllt werden kann, ist deren Aussetzung unvoreingenommen zu prüfen. Ein Aussetzen aber von Trophäen-



wild muß nicht sein. Besser ist Wiedereinbürgerung. Dem Muffel- und besonders dem Sikawild stehe ich skeptisch gegenüber.

THAMDRUP: Es wäre sehr wertvoll, wenn man bei weiteren Untersuchungen über die durch das letzte Jahrhundert stattgefundene Entwicklung von den Wildbeständen die einzelnen Faktoren (Klima, Landschaftsveränderungen usw.) in Relation zum Bestandszustand analysieren würde. Zum Beispiel hat Kalela die Verbindung zwischen gewisse Tierarten und Klimaverschiebungen behandelt. Solche Untersuchungen, die sich auch mit Landschaftsänderungen beschäftigten, wären sehr wertvoll.

MÜLLER-USING: Ich stimme diesen Bemerkungen voll zu.

HALTENORTH: Hat man genauere, d.h. nicht nur allgemein formulierte Anhalte dafür, daß das Großwild in Mitteleuropa bei seiner starken Vermehrung in den letzten 100 Jahren sich im Verhalten umgestellt und damit an das nähere Zusammenleben mit den Menschen angepasst hat, ähnlich wie es von Amsel, Singdrossel, Misteldrossel, Buchfink, Ringeltaube u.a. Vogelarten bekannt ist? Ist dieser Frage schon einmal eine wissenschaftliche Untersuchung gewidmet worden?

MÜLLER-USING: Anpassungsfähigkeit bestand wohl immer. Die letzte große Probe dürfte die Anpassung an die Motorisierung gewesen sein – sehr geringe Verluste beim Rotwild. Keine Spezialuntersuchung.

LEONHARD: Anpassungsfähigkeit des Wildes ist groß. Alle Wildarten haben sich z.B. gut an die Kartoffel gewöhnt.

Europäisches Wild, das in anderen Kontinenten ausgesetzt wurde, hat sich unter vollkommen anderen Umweltfaktoren hervorragend entwickelt. (Rotwild in Südamerika, Rotwild und Gamsen in Neuseeland.)

MÜLLER-USING: In der Tat sind besonders viele Großwildarten eurytop, insbesondere auch mediterrane Formen und sogar tropische. Als am wenigsten anpassungsfähig haben sich arktische Arten erwiesen.

TUESDAY, 15 OCTOBER

## MAMMAL AND BIRD PESTS ON THE LAND

*Harry V. Thompson*

Ministry of Agriculture, Fisheries & Food, Infestation Control Division,  
Hook Rise, Tolworth, Surbiton, Surrey, England

The acreage of crops and grassland (31,015,000) in the United Kingdom is small, compared with the population (51,221,000) and crop and animal husbandry are consequently most important; the gross agricultural output for the year ended 31st May, 1957 was £ 1,375 million and the net output £ 950 million.

Unlike the U.S.A. and many European countries the concept of game as a crop has yet to be fully accepted. There are several reasons for this: until this century game preservation was in the hands of a small number of people and penalties for poaching were extremely severe; estates were sometimes devoted entirely to the artificial propagation of game, to the detriment of general agricultural production; and, in the interests of game, predatory birds and mammals were ruthlessly destroyed. There is much sentiment in favour of natural wildlife in Britain and most species of birds are now protected by the Protection of Birds Act (1954).

The aims of agriculture, hunting, public amenity, game preservation and other aspects of wildlife conservation can never be identical although they have many interests in common. The only solution is a compromise and, for the general good, wildlife needs to be fitted into a balanced pattern of land management, of which farm pest control is an integral part.

There is certainly need for a more enlightened attitude towards predator control and, under proper wildlife management—including the provision of adequate cover—there should be an ecological balance between predators and prey (one that can be corrected as necessary by the manager) so that healthy game crops can be produced without detriment to agriculture.

The outright agricultural pests, unwanted by the general agriculturist or by the game preserver are (in the United Kingdom) the rabbit, brown rat, grey squirrel, wood-pigeon, rook, crow and magpie. These species must be continually controlled because they are too well adapted to be completely eliminated. The rabbit, for instance, will not be exterminated by myxomatosis. Its numbers were

reduced to a very low level by the disease in 1954-55, but the species has already made a considerable recovery and, although there have been and will continue to be further outbreaks of myxomatosis, it is equally sure that some rabbits will survive and, from the evidence that we have collected so far, that increasing numbers of rabbits will acquire immunity.

Our principal bird pest is the wood-pigeon, and although the present control method of shooting, especially over decoys, accounts for large numbers of birds, research is being devoted to alternative methods of control, particularly the destruction of nests at certain times of year and the use of narcotics.

#### DISCUSSION:

HARDENBERG: How high above the ground are the rabbit cages (—used for experiments on spread of myxomatosis through mosquitos—) placed? Do the mosquitoes fly so high?

THOMPSON: Five feet from the ground; woodland mosquitoes bite man at head level.

HARDENBERG: How far do the "narcotized" pigeons fly?

THOMPSON: Pigeons that have taken narcotic may fly up to 2 miles before becoming unconscious, but most of them fall within a radius of less than  $\frac{1}{2}$  a mile.

BORG: How many attenuated strains of myxomatosis virus have been isolated in England during the present epizootic? Has myxomatosis been diagnosed in animals other than rabbits, i.e. in how many hares?

THOMPSON: Up to August this year (1957) 12 attenuated strains of myxomatosis virus have been isolated in England. Apart from rabbits, myxomatosis has been diagnosed only in three hares of which two were of the genus *Lepus europaeus* and one of the genus *Lepus timidus*.

BORG: In what concentration do you use chloralose for catching pigeons in England?

THOMPSON: To catch pigeons a concentration of  $2\frac{1}{2}$   $\alpha$ -chloralose is used. About 50% of the pigeons will die from this concentration. Attempts are also made with weaker concentrations. At present chloralose is used only for experimental purposes. It may be used only early in the mornings, and all narcotized or dead pigeons must be picked up.

THAMDRUP: Here in Denmark it is believed that in places where rabbits are in plenty there are few hares. — Has there been an increase in hares in Great Britain in areas where myxomatosis has almost eradicated the rabbits?

THOMPSON: Yes, we have been expecting hares to increase in numbers, in the absence of competition from the rabbit. There will be some publication on this subject very shortly.

BLANK: Are wood pigeons regarded as a pest in any other European countries.

THOMPSON: Yes, in the Netherlands, and I am told that they may become a pest in Denmark.

FRINGALLE: En France la disparition du lapin a provoqué en de nombreuses regions une augmentation sensible des population de lièvre et de faisans, du fait — de la suppression de la concurrence du lapin vis à vis du lièvre

- de la suppression des grillages clôturant les cultures et plantations
- des efforts accrus des chasseurs pour multiplier les faisans (elevation) et les lièvres (lâchers) là où le lapin constituait avant un gibier important.

FRANK: 1) In Germany 3 races of myxomatosis are found on hares.

2) In Westdeutschland nahm der Bestand an Hasen nach Myxomatosis zu. Zahlenmäßig genau – ist es aber noch nicht erfasst.

TUESDAY, 15 OCTOBER

## ÜBER DEN TRANSPORT DES WILDES

Prof. Dr. *B. L. Jakšić*,

Beograd

Bei dem Transport des Wildes zeigt sich eine Reihe der Lebenserscheinungen die als Ergebnis der Angewöhnungsfähigkeit des Wildes entstehen.

In diesem Referat wünschen wir nur auf den Teil dieser Lebensmanifestationen hinzuweisen, die für Pathologie vom Interesse sind. Bei der Erforschung der Verluste die beim Transport der Hasen entstehen merkten wir, daß abgesehen von den durch Trauma entstandenen Verlusten, sehr oft zu solchen kommt die durch Ruptur der Harnblase entstehen. Bei der Prüfung der gestörten Urinierung, kamen wir zu dem Beschluß, daß dabei die Lage der Hasen in der Transportkiste eine Rolle spielt. Die Hasen liegen in denselben mit gebogenen Beinen was die physiologische Wirkung der Bauchmuskeln bei der Urinierung erschwert.

Beim Transport der Hasen melden sich auch verschiedene pathologische Veränderungen an den Augen. Es handelt sich meistens um Eiterungsprozesse. Die Ursachen sind die traumatischen Verletzungen der Augen die meistens bei dem Einsprung der Hasen in das Fangnetz entstanden sind. Diese Verletzungen sind ofte nur mikroskopisch sichtbar. In der Praxis können wir solche Erkrankungen vermeiden wenn wir jedem Hasen bevor er in die Transportkiste kommt Penizillinsalbe ins Auge einschmieren lassen.

Es ist bekannt, daß auch beim Transport der Rebhühner und unmittelbar nach diesem die Verluste entstehen. Bei der Untersuchung der Ursachen stellten wir fest, daß die Tiere wegen der Ausblutung in der Leber verendeten. Wir haben gemerkt, daß ein solcher Grund des Todes immer in Verbindung mit Aufregung der Tiere war.

Außer den angeführten Beispielen wo es möglich war die anatomischen Veränderungen festzustellen und diese mit dem Tode in Zusammenhang zu bringen konnten wir auch solche Fälle feststellen wo der Sektionsbefund negativ war. Das ist häufige Erscheinung beim Transport von Rehen und Hirschen. Die Frage der sogenannten Eisenbahnkrankheit ist bei dem Wilde noch nicht geklärt. In den Transportbedingungen konnten wir keine Beschädigung des Herzmuskels

beweisen, welche den materiellen Grund der Eisenbahnkrankheit herstellen würde. Derselbe Fall ist mit der Diarrhöe bei Rehen und den Gemsen während der Zeit des Transportes oder nachher. In jedem Falle kann man als Regel annehmen, daß es sich um das Futter handelt. Ob aber allein das Futter *primus movens* der Störung im Digestionsapparat ist, ist eine Frage die noch nachträgliche Erforschungen benötigt. Wir haben nämlich in zwei Fällen degenerative Veränderungen auf *Plexus myentericus Auerbachii* registriert, die eine Grundlage für die Entstehung des Reilly-Syndroms darstellen.

Die angeführten Beispiele beziehen sich auf die Fälle, bei denen vor dem Transport keine pathologische Zustände waren. Aber sehr oft melden sich die Verluste, wenn die bestimmten pathologischen Prozesse bestehen. In diesen Fällen meinen wir an erster Stelle die Invasionskrankheiten. Uns persönlich sind die Fälle bei Hasen bekannt, wo die Cysticerkose in mittlerem Stadium war, und das war bei der Obduktion der transportierten Hasen die einzige pathologische Veränderung. Bei der näheren Prüfung dieser Fälle überzeugten wir uns über die Regelmäßigkeit dieser Erscheinung. Ähnlich ist es auch mit dem parasitären Lungenerkrankungen des Rehwildes.

Die angeführten Beispiele zeigten von welcher ökonomischen und wissenschaftlichen Bedeutung die Forschung des gesamten Komplexes des Transportes von Wild ist. Unsere bescheidene Erfahrungen überzeugten uns daß es sich hier auch um Fragen handelt die von großer Bedeutung bei Zucht des Wildes sind.

#### DISCUSSION:

MÜLLER-USING: Als Folge von Gefangennahme und Transport wäre vielleicht eine Beeinflussung der endokrinen Drüsen denkbar, z. B. der Thyreoidea.

JAKŠIĆ: Wir haben etwas über Untersuchung vom endokrinen System bei den Tieren in Transport gearbeitet. Bis jetzt kann nicht Sicheres über diese Arbeit gesagt werden. Nachfolgende Erforschungen sind im Gange.

JACZEWSKI: Ich habe einige Erfahrungen mit dem Transport des Rotwilds. Ich meine, daß es sich oft um die Reizung des Nervensystems handelt. Ich habe mit guten Resultaten ein paar Rotwild in Chloralhydrat Narkose transportiert. Chloralhydrat war per rectum den Tieren gegeben. Ich meine, daß die Chloralnarkose wahrscheinlich die beste ist.

JAKŠIĆ: Wir haben eigene Erfahrungen mit Narkose vom Wild. Wir glauben aber, daß die Frage nicht so ganz einfach ist, und daß der gesamte Komplex des Transportes studiert werden muß.

BORG: Für die perorale Narkose von wilden Tieren in Gefangenschaft eignet sich die  $\alpha$ -Chloralose sehr gut. Das Chloralosepulver wird in einem Futter vermischt, das den Tieren nach einigen Stunden hungern angeboten wird. Als Futter eignet sich für Hirsche zerschnittene Mohrrüben oder Hafer, für Braunbären Honig oder gemahlene Fleisch, für Eisbären gemahlene Fleisch. Die Dosierung

ist 50–150 mg  $\alpha$ -Chloralose pro kg Körpergewicht. Als ein Beispiel kann erwähnt werden, daß eine ausgewachsene Elchkuh mit einem Körpergewicht von schätzungsweise 300 kg vor kurzer Zeit narkotisiert wurde. Sie erhielt eine Totaldosis von 45 gr  $\alpha$ -Chloralose (mit zerschnittenen Mohrrüben vermischt), die Narkose tritt nach 3½ Stunden ein und nach weiteren 9 Stunden erwachte sie. Die angegebene Menge von 45 gr dürfte als maximale Dosis zu betrachten sein.

JAKŠIĆ: Das ist sehr interessant. Wir haben keine eigene Erfahrungen mit  $\alpha$ -Chloralose.

TUESDAY, 15 OCTOBER

14.00 Chairman: Stane Valentincic. Secretary: K. Paludan.

DIE WIEDERENTDECKUNG DES MESOPOTAMISCHEN DAMWILDES,  
CERVUS (DAMA) DAMA MESOPOTAMICA BROOKE, 1875

*Theodor Hattenorth*

Zool. Sammlung des Bayer. Staates, München

Der europäische Damhirsch war der Zoologie bereits von jeher bekannt, weshalb ihn auch LINNE in sein Systema Naturae mit aufnahm, wo er in der 10. Auflage von 1758 unter dem Namen Cervus dama mit aufgeführt ist. Umso mehr überraschte es, als BROOKE 1875 in den Proceedings of the Zoological Society of London eine neue Damhirschart unter dem Namen Cervus mesopotamica beschrieb. Die Beschreibung erfolgte nach einem Fell und Schädel mit halbfertigem Bastgeweih, beide von einem Tier stammend, das der englische Vizekonsul in Basra, ROBERTSON, nordöstlich der Stadt am Flusse Karun geschossen hatte. ROBERTSON sammelte noch 10 Abwurfstangen für das Britische Museum und beschaffte 1877 einen Hirsch und 1878 ein Damtier für den Londoner Zoo, wie aus den Proceedings von 1878 zu entnehmen ist. Über den Verbleib der beiden lebenden Tiere ist weiter nichts ausgesagt, vermutlich gelangten ihre Überreste auch in das Britische Museum. 1917 erhielt das Britische Museum noch ein Geweih aus Zacho an der Grenze von Irak und Türkei. Vorher war gegen Ende des vorigen Jahrhunderts noch ein Hirsch bei Bozlar, südwestlich Panderma am Südufer der Marmara, von dem Engländer WHITALL und ebenfalls einer von Sir Edmund LODER in Luristan geschossen und zeitlich wohl noch früher von Pater A. DAVID ein Geweih in Kleinasien für das Pariser Museum gesammelt worden. Über den Verbleib des Whitall'schen und Loder'schen Stückes wird nichts berichtet. Auch brachte HAGENBECK 1901 ein Geweih aus Persien nach Hamburg mit, das ihm jedoch nach einigen Jahren aus seinem Hause gestohlen wurde und nicht wieder auftauchte. Das Museum Koenig in Bonn erhielt vor dem 1. Weltkrieg 2 einzelne Abwurfstangen aus Westpersien aus dem Gebiet zwischen Burudjird und Kirschmanschah (Kermanschah), die Paschen sammelte.

Außer diesen Fundstücken soll WHITALL in seiner Jugend den Hirsch noch in Thrazien an den Ufern der Maritza und auch im Karabogha-Dhag, einem mittel-



anatolischen Gebirge nordöstlich des Tus-Tschöllü-Sees gesehen haben. Auch wird von ähnlichen Sicht-Nachweisen aus dem Juaurud-Gebiet in Kirschmanschah und aus dem Gebiet des Oberlaufes des Diz in Luristan aus der Zeit vor dem 1. Weltkrieg berichtet.

Nach ELLERMAN & MORRISON-SCOTT's Checklist of Palæarctic-Mammals (1951) gilt die Form seit 1917 als ausgestorben. Andererseits behaupten BANOGLU & BURR (1952), daß sie noch an den Nordabhängen des Taurus lebe, wo sie durch das türkische Jagdgesetz von 1937 geschützt sei. Ob jedoch die obengenannten thrazischen und kleinasiatischen einschließlich der Taurus-Hirsche wirklich mesopotamische Damhirsche sind, zum mesopotamischen Namen gehören, ist zweifelhaft, da BANOGLU & BURR in ihrer Schrift von 1952 einen europäischen Damhirsch abbilden.

1956 hörte mein Schüler TRENSE auf einer Jagdfahrt in Persien von einem Hirschkommen in Luristan. Das bewog mich, ihm die Möglichkeit zu verschaffen, das genannte Gebiet aufzusuchen, um nach diesem Hirsch zu forschen. Herr Dr. GEORG VON OPEL in Frankfurt a.M., der in Kronberg bei Frankfurt einen Privatzoo unterhält, den er dankenswerter Weise der Forschung zur Verfügung stellt, gab dazu die Mittel, während die persische Regierung und der dort unten lebende deutsche Arzt Dr. FRÖCHEL, als hervorragender Kenner des betreffenden Gebietes, jede Hilfe leisteten. TRENSE gelang der Erwerb eines lebenden jungen Hirsches für den Tiergarten des Herrn Dr. VON OPEL. Auch sammelte er über 1 Dutzend Abwurfstangen. Er stellte fest, daß die Damhirsche dort, wo sie vor 80 Jahren von ROBERTSON entdeckt wurden, heute in 2 dschungelartigen Buschwäldern noch ein letztes Restvorkommen von rd. 2 Dutzend Tieren haben, daß sie sehr scheu, durch die Eingeborenen, Überschwemmungen und Äsungsmangel sehr bedroht sind und nur der Undurchdringlichkeit der Buschwälder ihr Überleben bis heute zu verdanken haben. Auf meine Vorstellungen hin, diese Tiere, als vermutlich letzte lebende Vertreter des echten mesopotamischen Damhirsches vor dem Ausgerottetwerden zu bewahren, gab Herr Dr. VON OPEL dankenswerter Weise wiederum die Mittel für eine Expedition, die mit Hilfe der persischen Regierung z.Zt. versucht, noch weitere Tiere nach Kronberg zu bringen, um durch gesicherte Vermehrungszucht die Form zu retten.

Der Mesopotamische Damhirsch ist eine gute Unterart, die sich in Geweih, Spiegel- und Wedelform und -farbe klar von europäischen Damhirsch unterscheidet. Abbildungen von ihr gibt es bereits aus der assyrischen Zeit.

Einzelheiten der Lebensweise sind kaum bekannt, doch hoffen wir durch TRENSE's Untersuchungen an Ort und Stelle Näheres zu erfahren.

Ihr Zusammenhang mit dem Europäischen Damhirsch und die vermutliche

stammesgeschichtliche Entwicklung und Verbreitung beider Formen wird z.Zt. von mir untersucht. Darüber wird an anderer Stelle berichtet werden.

DISCUSSION:

FRANK: Wenn in 3 Wochen so viele Abwurfstangen gefunden werden können, dann muß der Bestand stärker sein.

HALTENORTH: Die Stangen sind bei den Eingeborenen der dortigen Gegend vorgefunden worden, stammen also aus einem unbekannt langen Zeitraum.

MÜLLER-USING: Es wird auf das in kretischen und griechischen Darstellungen (z.B. Vasenmalweisen) vorhandene Damhirschmaterial hingewiesen, das für taxonomische Probleme verwendbar zu machen ist.

HALTENORTH: Dies Material habe ich noch nicht genauer studiert.

TUESDAY, 15 OCTOBER

## JAGDLICHE FORSCHUNG AUF LANDSCHAFTS BIOLOGISCHER GRUNDLAGE

Dr. phil. *Heinz Brüll*

Schleswig-Holsteinische Forschungsstation Wild, Wald und Flur

Unsere Zeit zeichnet sich durch eine Vielzahl von Sonderinteressen der Menschen im Rahmen einer gesetzten Ordnung des Lebendigen in den Landschaften aus. Dieser Tatbestand kommt in der Bundesrepublik Deutschland deutlich darin zum Ausdruck, daß sich hier über 60 verschiedene Vereinigungen die Erhaltung der Natur angelegen sein lassen wollen. Dabei ist ein völliger Mangel einer für alle verbindlichen Konzeption, einer synthetischen Schau der Sache dienlicher Ergebnisse biologischer Forschung dem gemeinsamen Ziele abträglich.

Zunehmend setzt sich die Erkenntnis durch, daß die Landschaften mit ihren verschiedenen Bodenarten, ihren Pflanzen- und Tiergesellschaften hinsichtlich ihrer Funktionen als den Einzellebewesen übergeordnete Lebenseinheiten aufzufassen sind (von geographischer Seite besonders VOLZ, 1923 und TROLL, 1950). Im Rahmen dieser Einheiten geht jedes Individuum bestimmte Beziehungen zu Dingen seiner Umgebung ein, die nach v. UEXKÜLL als „Nahrung“, „Geschlechtspartner“ und „Feind“ zu definieren wären.

Die Funktion eines Lebewesens wird durch drei wesentliche Prinzipien gewährleistet, nämlich durch den Stoffwechsel, die Regeneration und die Regulation. Wir haben zu fragen, ob diese Prinzipien nicht auch für die biologischen Funktionen in den Landschaften gültig sind. Gehen wir dieser Frage nach, treiben wir „Landschaftsbiologie“.

Alle Lebewesen zeigen sich mit ihrer Ernährung als Glieder der umfassenden Stoffwechselkette der Landschaften. Schon der Ausfall einer Art muß darum Störungen zur Folge haben. Tatbestände, die für die Richtigkeit solcher Auffassung sprechen, sind in bedenklich zunehmendem Maße zu beobachten.

Das Prinzip der Regeneration leuchtet aus der Vermehrungsziffer der einzelnen Arten im engsten Zusammenhang mit ihrer Siedlungsdichte hervor. Bis heute sind wir noch nicht in der Lage, sichere Aussagen über den normalen Schwankungsbereich der Siedlungsdichten selbst solcher Tiere zu machen, die von

jagdlichem Interesse sind. Es sei noch besonders hervorgehoben, daß die jagdbaren Tiere auf das Engste mit der Pflanzendecke und nicht jagdbaren Tieren verzahnt sind, sodaß es zu dem Rüstzeug des Jägers unserer Tage gehören sollte, mit einem weiten Blick solche Zusammenhänge überblicken zu können.

Es wird eine erste, noch weitgehend theoretische und nur für den Habicht weitgehend gesicherte Übersicht vorgelegt — Tabelle:

Art:	Territorium:	Nachkommen:
Uhu.....	12—14 000 ha	1—2 nicht jedes Jahr!
Habicht.....	3—5 000 ha	3—4 / Jahr
Kolrabe.....	1 700 ha	2—6 / Jahr
Fuchs.....	1 500 ha	3—8 / Jahr
Sperber.....	700 ha	2—6 / Jahr
Marder.....	500 ha	3—5 / Jahr
Bussard.....	500 ha	1—3 / Jahr
Krähe.....	400 ha	4—5 / Jahr
Hermelin.....	300 ha	4—7 / Jahr
Turmfalk.....	200 ha	3—6 / Jahr
Mauswiesel.....	100 ha	5—7 / Jahr
Fasan.....	50 ha	8—12 / Jahr
Rebhuhn.....	20 ha	7—19 / Jahr
Hase.....	10 ha	3—4 × 2—4 / Jahr
Kaninchen.....	1 ha	4—5 × 5—12 / Jahr
Sperling.....	300 m <sup>2</sup>	3 × 5—6 / Jahr
Maus.....	10 m <sup>2</sup>	4 × 8—10 / Jahr

Die Territoriumsangaben sind auf weibliches Stück + Geheck, bzw. Paar + Nachkommen zunächst im wesentlichen theoretisch zu verstehen. Die Wechselbeziehungen im Rahmen des Stoffwechsels verdeutlichen in der Senkrechten das Prinzip der Regulation, in der Wagerechten das Prinzip der Regeneration.

Landschaftsbiologisch gesehen wäre grundsätzlich die Auffassung geboten, die Landschaft als eine dem Einzelwesen übergeordnete Lebenseinheit aufzufassen. In dieser walten als Leistungsprinzipien der Stoffwechsel, die Regeneration und die Regulation. Sie erhalten die lebendige Ordnung, die auch dem waidgerechten Jäger seine Ernte ermöglicht. Es sollte darum die Aufgabe jagdlicher Forschung sein, dem Jäger ein Rüstzeug anzubieten, das ihm eine Bejagung seines Reviers nach den Gesichtspunkten der Nachhaltigkeit ermöglicht. Dabei werden wir vor die Entscheidung gestellt, ob wir auf der Grundlage einer „Wildfarm“, d. h. unter

weitgehender Ausschaltung aller natürlichen Regulatoren unter einseitiger Förderung nur des wohlschmeckenden Wildes vorgehen wollen, oder ob wir als Jäger im Jagdrevier selbst als sinnvolle Regulatoren teilhaben wollen an zumeist nur noch allerletzten Resten einer ursprünglichen, lebendigen Ordnung der Landschaften.

Diese Ordnung ist weitgehend in Frage gestellt durch:

1. Intensivierende Maßnahmen und Wirtschaftsformen der Land- und Forstwirtschaft,
2. Verkehr,
3. Unkrautbekämpfungen,
4. Schädlingsvergiftungen.

Da nach der bisherigen Kenntnis der Äsung des Flugwildes dieses schwerpunktmäßig auf Wildkräuter (Unkräuter) und nur am Rande auf Kulturpflanzen (Rebhuhn, Birkwild, Fasan — Getreide) angewiesen ist, wird es auch zu den Überlegungen der jagdlichen Forschung auf landschaftsbiologischer Grundlage gehören, auf welche Weise dem Wild seine Äsung erhalten, bzw. verbessert werden kann. Dies kann dazu führen, daß Probleme in das Arbeitsgebiet hineinstrahlen, die nicht unmittelbar jagdlichen Anstrich haben.

Die jagdliche Forschung auf landschaftsbiologischer Grundlage soll dem Jäger unserer Tage das Rüstzeug vermitteln, sich als sinnvoller Regulator und damit als Erhalter der Reste einer ursprünglichen Ordnung des Lebens in den Landschaften zu betätigen. Auf solcher Grundlage wird der Jäger zum wahren Naturschützer.

#### DISCUSSION:

EGENRAAM: In unserem Lande hat die Populationsdichte des Habichts in den letzten Jahrzehnten sehr stark zugenommen etwa von 3 Brutpaaren im ganzen Lande bis zu mindestens das 100-fache. Festgestellt ist z. B. 3 Brutpaare auf 100 ha Wald.

Gleichzeitig haben wir in der Niederlande ein Saatkrähenproblem, ein Dohlenproblem und ein Ringeltaubenproblem. Also sind mit der Zunahme des Habichts seine Beutetiere immer zahlreicher geworden. Von einer regulierenden Wirkung ist hier doch nichts aufzuweisen.

BRÜLL: 3 Brutpaare auf 100 ha Wald liegen erfahrungsgemäß in Form eines Dreiecks von 3–5 km Seitenlänge zueinander; um die Maße des Dreiecks kann man einen Kreis von 6 km Radius schlagen und diesen in 3 Sektoren aufteilen. Man hat dann die 3 Reviere der 3 Paare. Saatkrähen und Dohlen werden vom Habicht nur selten erbeutet, da sie in Schwärmen auf Nahrungssuche fliegen, sich darum gegenseitig vor dem Feinde schützen.

VALENTINCIC: Sie haben über ein biocönotisches Gleichgewicht in der Natur gesprochen, und dabei haben Sie nicht in Betracht genommen, daß der Mensch die Möglichkeit hat, die Rolle gewisser Raubtiere zu übernehmen. Mir ist ein Fall bekannt, wo so viele Bussarde abgeschossen wurden (wegen den Junghasen, die sie hier und da nehmen), daß die Mäuse schrecklich zunahmen.

BRÜLL: Die von Herrn Dr. Valentincic vorgetragenen Erfahrungen zu dem Punkte Abstimmung einer Tierart auf die andere hinsichtlich Siedlungsdichte und Vermehrungsziffer = Regenerationskraft zeigen abermals die Rolle auf, die der Mensch in der übergeordneten Lebenseinheit Landschaft kraft seiner Erkenntnisfähigkeit zu spielen hat. Auch der Mensch kann nicht mehr sein, als ein weiser Regulator, der die von der Natur angebotenen Kräfte klug benutzen sollte, um die Landschaft, auf welchem Gebiete auch immer, voll leistungsfähig zu erhalten.

TUESDAY, 15 OCTOBER

## SOME STUDIES ON HARE POPULATIONS

*Johs. Andersen*

Danish Game Research Station, Kalo pr. Ronde

The series of publications commencing by the recently published paper, "Studies in hare populations I. Fluctuations" will contain some further studies on the biology of hare populations. Some of the aspects to be discussed in forthcoming contributions will be commented upon here.

It has been found that the chief characteristic of young hares, the so-called "Strohsches Zeichen" disappears at an age of about 7 months but that it is subject to some individual variation.

Between 1 October (beginning of season) and the middle of January (and probably even middle of March) the percentage of young present in the population decreases in all areas studied. Therefore, the percentage of young hares has no well defined meaning when estimated in late autumn. This conclusion was based upon wild hares marked and recaptured as well as upon hares kept in captivity.

By capturing quite young hares, marking, releasing and recapturing them it has become possible, on the basis of observed increases in weight, to construct a growth curve for the hares of a single district.

By weighing the young hares shot during the autumn in different districts over a period of three years and by taking the weights to represent ages a curve has been obtained by which the approximate time of birth can be estimated.

The curve shows the bulk of hares to be born in April, May and June while the breeding period extends from March to August. The material underlying this study consists of 2700 weighed young hares.

In order to get an idea of the turnover of a population of hares population counts have been carried out in 8 different places. It is not possible to count directly, therefore a number of hares were caught in nets, marked and released. The bag of the following shoots were analysed by calculating the proportion of marked hares in the total bag. On this basis it was possible to calculate the population size at the beginning of the shoot.

One example is used for illustration, a typical case, and it appeared that the population was 3-4 times larger than originally assumed.

Where light shooting pressure is used (one or two drives per year) the proportion of the population harvested by sportsmen in an area like this only amounts to a few per cent.

#### DISCUSSION:

RIECK: Da bisher kein besonders Jugendmerkmal vorhanden war, wurde das Strohsche Zeichen zur Analyse von Hasenstrecken und Schlußfolgerungen hieraus auf den Jahreszuwachs benutzt. Wir haben nun erfahren, in welchem Umfange diese Methode von den tatsächlichen Verhältnissen abweicht und müssen versuchen, die Fehlerquelle rechnerisch auszugleichen.

Die Frage, ob Häsinnen im Jahre ihrer Geburt noch Junge bringen, wird dahingehend beantwortet, daß Anzeichen hierfür bei den dänischen Untersuchungen nicht gefunden wurden.

Die weitere Frage, ob bei den ausgewachsenen Hasen ein bleibender Gewichtunterschied zwischen früh und spät im Jahr gesetzten Jungen zu bemerken ist, wird verneint.

FRANK: Können die Gewichte auch wegen klimatischer Unterschiedlichkeiten uneinheitlich sein? Es wird erinnert an die Gewichtszunahme des Hasen im Verlauf einer kalten Periode.

ANDERSEN: Gewichtunterschiedlichkeiten auf ein einzelnes Revier treten hier im Lande so zerstreut auf, daß es nicht wahrscheinlich ist, daß Zusammenhang mit den klimatischen Unterschiedlichkeiten besteht. Ich habe dies Verhältnis doch nicht untersucht.

TILGNER: It is surprising that you did not find any difference in the method of hunting upon the quantity and composition of the bag.

In Poland the kettle method was forbidden on account of destroying too many stock hares and the driving method permits more of them to escape.

The average Danish size of bag consisting of 8-10 hares (100 ha.) per season seems to be low compared with the obtainable maximum of 83-120 hares/100 ha. Hence the methods of investigation should be still more analytical.

ANDERSEN: I am quite sure that the different methods of hunting do not result in an especially great bag of a certain sex or age group. The result in my paper from 1953 has later on been further confirmed.

TILGNER: How much kidney fat do your hares have, 30-40 g. per hare or coming up to 120 g./hare?

ANDERSEN: I have not measured the quantity of kidney fat.

LUND: Was any difference found in the sex ratio for adult and young hares?

ANDERSEN: A diminutive difference was found, but so little, that it will have no importance. About this question I will go into details in a paper to come.

LOWE: Has any difference been observed in the rate of growth between hares born in the first part of the year and those born at the end of the season in any one district?

Does this allow the hares to be placed in different groups of age during the winter and shooting season?

Can weight be used at all in getting an age distribution of the population?



ANDERSEN: I have observed no difference in the rate of growth in the different seasons. Besides my material is scarcely great enough, but perhaps it will be so later on.

HAGEN: Weight curve for determining age of young does not, as you know, give exact results, owing to individual spreading of growth rate. If you want to use the weight you might, therefore, also measure a linear dimension at the same time, presupposed that such a measure can easily be taken. If you have two data, namely, instead of one, you can control whether an individual young is a plus-variant or a minus-variant. This enables you to rubricate the young more closely to its true age. (In determining age of Willow Grouse chicks by means of weight, we counted, in addition, also the number of shed quills).

ANDERSEN: In a following paper it will appear that I have extensively provided for a dispersion of the single items of the growth curve. The weight of the young hares has only been used for stating the time of birth within a period of 1 month, and not on a single day.

The use of a linear dimension, for instance the length of the hind foot, is technically difficult, but I am aware of this possibility.

WEDNESDAY, 16 OCTOBER

9,00 Chairman: F. Nüsslein. Secretary: K. Paludan.

## THE ORGANIZATION AND SCOPE OF GAME RESEARCH IN A NUMBER OF EUROPEAN COUNTRIES

*H. M. Thamdrup*

Danish Game Research Station, Kalø pr. Rønde

By way of questionnaires some information on the organization and scope of game research in various European Countries has become available. I extend my best thanks to the following gentlemen for supplying information: Dr. D. Amon (Austria), Dr. L. Siivonen (Finland), Mr. G. Pringalle (France), Professor, Dr. H. Gäbler (East Germany), Professor, Dr. F. Nüsslein (West Germany), Mr. C. L. Coles, Dr. T. Blank and Dr. G. V. T. Matthews (Great Britain), Mr. W. J. Schuitemaker (Holland), Dr. Y. Hagen (Norway), Professor, Dr. D. J. Tilgner assisted by Dipl.ing. Paslawski and Dipl.ing. Frankiewicz (Poland), The Game Research Council (Sweden), and Professor, Dr. Stane Valentincic (Yugoslavia).

The immediate purpose of bringing together information on the organization and scope of game research was to present a source of information for use when it is desired to apply to the authorities in an attempt to find new ways of promoting or consolidating game research.

It is also quite possible that a summary of the present status may otherwise prove useful to research workers.

During a period of building up it is especially valuable to be aware of the ways in which similar problems are tackled by other institutes. The contact now created through the International Union of Game Biologists should also gain importance within the field of coordinating the European game research.

Based upon the information obtained I shall try to present summaries of the following points:

- A. Game research institutes and experimental areas.
  1. Self-contained institutes.
  2. Research in connection with other institutes.
  3. Staffing.

- B. Financing of game research.
  - 1. Sources.
  - 2. Budgets.
- C. Current research activities.
- D. The relation of game research to others.
  - 1. Relation to central organizations.
  - 2. Cooperation with related organizations.
  - 3. Game research as adviser to the authorities etc.
  - 4. Informing sportsmen and others about the results of game research.

*A. 1. Self-contained game research institutes.*

Institutes chiefly concerned with game research are found in:

DENMARK. Danish Game Research Station, Kalø pr. Rønne has been established on a Government-rented estate of about 1 000 ha which acts as an experimental area. In addition an island of about 100 ha is available for experiments. Staff: 1 leader, 2 scientists, 6 technicians.

FINLAND. The Finnish Game Research Institute, Helsinki, with 3 Game Research Stations and 7 Archipelago Control Stations and special research areas (e.g. 10.000 ha in Evo). Staff: 4 (+ 1) scientists, 4 technicians etc.

WEST GERMANY. Institut für Jagdkunde der Universität Göttingen, Hann.-Münden. No experimental areas. 1 director, 3 assistants, 3 others. – Forschungsstelle für Jagdkunde des Landesjagdverbandes Nordrhein Westfalen, Bonn. 1 scientist. – Niederwildforschungsstelle des Landesjagdverbandes Schleswig-Holstein, Weißenhaus b. Glücksburg. 1 scientist.

GREAT BRITAIN. I.C.I. Game Research Station, Fordingbridge. Experimental area of 2 000 ha available. Director, deputy director, estate manager, 4 scientists, 3 game breeding specialists, several game keepers and 3 advisory officers. – The Wildfowl Trust, Slimbridge, covers the whole country in connection with wildfowl investigations. The headquarter is at Severn. Two duck-decoys are operated and other ringing stations maintained. Government-owned refuges are used for investigations on wildfowl. 10 scientists and 25 others are members of the staff. Further a great number of voluntary workers assist. – The Nature Conservancy maintains on some of its Nature Reserves special studies on the red deer in Scotland. Breeding behaviour, productivity, mortality, food, etc. being on the programme. Staff: Director, 1 scientist, 2 other members.

HOLLAND. The Institute for Biological Field Research (I.T.B.O.N.) Arnhem. No experimental area. 1 scientist and 6 technicians.

NORWAY. The Norwegian State Game Research, Oslo. Several areas available, one for game research purposes only. 3 scientists, 1 technician.

SWEDEN. The Game Research Station of The Swedish Sportsmens Association, Söderhamn. Certain areas reserved for game research. 1 director and technical assistance.

YUGOSLAVIA. The Game Research Institute, Beograd. No special experimental areas. 6 collaborators.

*A. 2. Game research carried out as part of the activities of other institutes.*

Research institutes of this kind are not easily accounted for and the following list is far from being exhaustive.

AUSTRIA. To a large extent game research in Austria has been organized through Österreichische Arbeitskreis für Wildtierforschung (Ö.A.f.W.) with more than 300 members associated with Universities and other educational institutions, biological stations, Austrian "Vogelwarte", veterinary institutes, forestry institutes etc. – Through annual meetings and publications the Ö.A.f.W. makes an attempt to coordinate efforts so as to overcome the drawbacks of not having an "Institut für Wildtierforschung". – Certain areas can be made available for field studies. A "Kontroll"-area of 125.000 ha has been marked for various purposes including game research.

DENMARK. Jagtfondets Vildtbiologiske Undersøgelser: Division for game diseases is associated with the Veterinary Serum Laboratory in Copenhagen. 1 scientist. Division for food investigations and parasitology in the Zoological Museum in Copenhagen. 1-4 scientists. The National Committee for Nature Protection runs various nature reserves for scientific purposes, also for game research. 1 scientist.

FINLAND. Studies on game diseases take place in The State Veterinary Institute in conjunction with The Game Research Institute. Two members of the staff of the latter Institute are lecturers (docenter) in the University of Helsinki, hence advanced students also participate in game research work.

FRANCE. No self-contained institutes for game research but certain institutes have special departments devoted to game. Under the Laboratoire National des Recherches Veterinaires is Section d'Etudes des Maladies du Gibier, Alfort.

Under Institut National des Recherches Agronomique: Laboratoire de Toxicologie du Conseil Supérieur de la Chasse, Versailles. Also to be mentioned: Le Museum National d'Histoire Naturelle (Migrations of mammals and birds). L'Institut Pasteur de Paris. Conseil Supérieur de la Chasse has three areas specially devoted to game breeding (l'élevage) and associated problems.

EAST GERMANY. All research projects dealt with by staff members of Universities and Higher Schools are coordinated by Der Arbeitsgemeinschaft für Wildforschung der Deutschen Akademie der Landwirtschaftswissenschaften and the Oberster Jagdbeirat in Berlin.

WEST GERMANY. In addition to staff members of zoological and veterinary institutes etc. working on game problems should also be mentioned Der Technische Zentralstelle für Forstwirtschaft in Hamburg. Part of the programme of this institute concerns game research. 1 scientist in the latter institute.

GREAT BRITAIN. Several scientists in various institutes engaged in game research work. Using a somewhat narrower angle of view e.g. the Grouse Research Unit should be mentioned here. It works in conjunction with The University of Aberdeen and the Nature Conservancy. 2 scientists in the Grouse Unit. – The Infestation Control Division, Surbiton, (Ministry of Agriculture, Fisheries and Food) should also be mentioned. It is engaged in research on game species which may become pests (rabbits, pigeons, deer etc.). Size of staff for such purposes not easily determined.

HOLLAND. Institute for Field Ecological Research, Utrecht, undertakes studies on seals, and waterfowl counts. Ecological Institute, Arnhem, undertakes bird-banding. Also: Department of Game Management with 1 scientist.

NORWAY. Norwegian Veterinary Institution carries out game work, this also applies to the Zoological Museums.

POLAND. The Institute for Technology of Animal Products (Gdanska, 1 scientist), the Institute for Anatomy of Domesticated Animals (Krakow, 1 scientist), the Institute for Physiology (Warszawa, 1 scientist) and the Polish Forest Research Institute (3 scientists) all do research work on certain game problems. – In 1956 the Game Research Department of the Forestry Institute had at its disposal 18 experimental areas. The Polish sportsmen association has 20 areas with 300.000 ha available for game research. 1946 to 1952 7 experimental areas were especially studied to obtain information on quantity and quality of the annual bag of hares.

SWEDEN. The Royal School of Forestry possesses a department of Forest Zoology which also comprises game research. 1 scientist. The State Veterinary

Medical Institute has a special division for game research with 1 scientist on full-time work. – Various studies on game animals are also carried out in the museums and other institutions.

YUGOSLAVIA. Forest and Game Institute, Zagreb. A staff of 3 persons. Forest Institute of the University of Ljubljana possesses a Department of Game Research with a staff of 6. University of Skopje: Staff of 3. Forest and Game Museum, Beograd. Game research also takes place in the Universities of Ljubljana and Skopje as well as in the Science Academy of Beograd.

*A. 3. Size of staff.*

On basis of the questionnaires it is difficult to give exact information on this point. I have tried to bring together all information available and the result is as follows:

*Self-contained game research institutes.*

	scientists	others
Finland . . . . .	4 (+1)	4
Denmark . . . . .	3	6
West Germany . . . . .	6	3
Great Britain . . . . .	15	34 (+?)
Holland . . . . .	1	6
Norway . . . . .	3	1
Sweden . . . . .	1	?
Yugoslavia . . . . .	6	?
	<hr/>	<hr/>
	39 (+1)	54 (+?)

*Game research connected with other institutes.*

Austria . . . . .	?	?
Denmark . . . . .	3 (+2)	?
Finland . . . . .	0	0
France . . . . .	?	?
East Germany . . . . .	?	?
West Germany . . . . .	1 (+?)	?
Great Britain . . . . .	2	–
Holland . . . . .	1	–
Norway . . . . .	3	?
Poland . . . . .	6	–
Sweden . . . . .	2	1
Yugoslavia . . . . .	12	–
	<hr/>	<hr/>
	30 (+2)	1

It would seem safe to assume that within the 12 countries considered a minimum of about 75 scientists are occupied largely by game research and that in addition at least another 60 individuals are engaged in administration, technical assistance etc. in this connection. On the other hand there can be no doubt that the latter group is defined in different ways in the 12 countries, and it can probably be estimated that the true numbers for either category are considerably higher than those given here.

*B. Financing of Game Research.*

AUSTRIA. Application for financial support is made for each individual research project by the Ö.A.f.W. The research is supported by public funds and by the Notring der wissenschaftlichen Verbände Österreich.

DENMARK. Game licence fees are paid to the Game Licence Foundation. By and large game research is financed through this annual revenue of approximately 1.5 mill. kr. On the whole the means of the Foundation are used in support of projects which are likely to promote game and game research in Denmark. The Foundation is under the administration of the Ministry of Agriculture in cooperation with the advisory Game Council. The annual game research budgets (including salaries etc.) amount to 200-250.000 kr.\*) which is about 13-16 per cent of the revenue from licence fees. It must, however, be mentioned that through agriculture and forestry the Kalø Experiment Farm makes a considerable profit of its own whereby game research expenses are much reduced. Taking this into consideration the annual cost of Danish game research involves an expenditure by the Game Licence Fee of kr. 115.000 per year, or 7-8 per cent of the annual revenue of the Foundation. Application for financial support has to be made every year but during recent years the budgets have been stable.

FINLAND. To an extent of about 90 per cent game research is financed through game licence fees paid to the Game Fund, to 3 per cent through private support and to 7 per cent through the sale of Game Research Institute publications. Through statute it has been decided by the Ministry of Agriculture that the institute is entitled to receive 15 per cent of the revenues of the Game Fund, but in practice it has remained at 10 per cent. The annual budget of the Finnish Game Research Institute totals approximately 10 mill. Finnish Mark of which the Game Fund contributes 8.5 mill. (= c. 190.000 d. kr.).

FRANCE. Game research is, first and foremost, financed through the Conseil Supérieur de la Chasse which has at its disposal part of the revenue from the game licence fees (approximately 7 per cent). 0.6-0.8 per cent of the revenue

\*) 100 d. Kr. = c. 5 £, c. 14½ \$, c. 60 Rm.

from licence fees are being used for purposes of game research. This amounts to about 8-10 per cent of C.S.C.'s total budget. The expenses incurred by the special nature reserves for research purposes are covered through other channels.

The following budgets may be quoted:

Section d'Etudes des Maladie du Gibier . . . . .	4-6 mill. frs.
Centre de Recherches sur les Migrations des Mam- mifères et des Oiseaux (Mus. National d'Hist. Nat.) and Bureau d'Etude des Migrations du Gibier d'eau du C.S.C. . . . .	3 mill. frs.
Other purposes (i. a. research on l'elevage du Gibier) . . . . .	6-12 mill. frs.
	<hr/>
	14½-22½ mill. frs.
	(= 255-375.000 d. kr.)

The budgets are regulated each year according to the projects under study.

EAST GERMANY. Game research is financed through the Government exclusively. At present it is impossible to quote the total budget as money is obtained through several channels. The financial support forms part of a long-term planning scheme ("Volkwirtschaftsplanung") under development.

WEST GERMANY. Game research is financed through the Government, through game licence fees and through private contributions. An example is quoted: The Institut für Jagdkunde in Hannoversch-Münden has an annual budget amounting to 3.300 DM (= 5.500 d. kr.) secured through Government funds plus salaries of director, 2 assistants and a fourth employee. Additional contributions from authorities and organizations vary in size between years. With the exception of the government grant applications have to be renewed each year. - About 50 per cent of the total revenue from licence fees are used for game purposes but only a very small fraction for research purposes.

GREAT BRITAIN. The I.C.I. Research Station has a fixed annual budget entirely defrayed by I.C.I. (Ammunition Department). The size of the budget is not quoted. The cost of the Grouse Research Unit in Aberdeen is partly covered through a grant from The Scottish Landowners' Federation which has fixed the budget for a limited number of years. The Nature Conservancy will also contribute funds to the Grouse Unit. - The Wildfowl Trust is basically self-supporting but grants are received from various Foundations. Grants for particular research work are received from The Nature Conservancy (Government, 110.000 d. kr.). The total sum devored to research work is about 300.000 d. kr. annually.



HOLLAND. Game research expenses are covered partly through Government grants and partly by the Game Fund and occasionally by private contributions (e.g. Society of Dutch Decoy Owners). The Game Fund owes its existence to the fact that licence holders on top of the licence (50 fl.) pay 5 fl. to The Game Fund. 5-6 per cent of the fund is used for game research. The annual research budget amounts to about 80.000 fl. (= 150.000 d. kr.). The annual budget is fixed but with possibility for additional grants in support of special projects.

NORWAY. The Norwegian game research is largely financed through The Game Fund which accumulates its means through game licences. Other public funds may occasionally give support to game research. The Game Fund contribution to game research represents about 10 per cent of the licence fee revenues. The game research budget is fixed at about 150.000 kr. per year (= c. 146.000 d. kr.).

POLAND. No means from Game Licences are used for game research. In 1957 The Polish Sportsmen's Association contributed 2.100 d.kr. towards veterinary studies on game. The game department of the Forestry Institute gets 10.500 d. kr. annually. Only this institute has a fixed budget for this purpose.

SWEDEN. The means for carrying out game research come mainly from The Game Fund to which the licence fees are paid in. The Fund is under administration by the State. For the year 1957-58 190.000 sw. kr. were made available, for 1956-57 155.000 sw. kr. The latter budget amounts to approximately 210.000 d.kr. and to 8 per cent of the game licence fees. The annual budget for game research is not fixed but it is hoped that the future budgets should not drop below the above sums.

YUGOSLAVIA. Game research is financed partly by the State, through the Game Institute in Beograd, and partly by The Federal Hunters' Organizations, the State Forest Departments and the management of larger hunting districts. The Hunters' Organizations are financed through the Game Rearing Fund. The following budgets are quoted:

Game Institute, Beograd . . . . . 5.0 mill. dinars (= 116,500 d.kr.)  
Game Section of Forest Inst., Ljubljana . . . 2.5 - - (= 58,250 d.kr.)  
The Institute in Beograd has a fixed annual budget for game research. The other institutes renew their applications each year.

*Conclusions concerning the financial situation.*

On summarizing the information concerning the financial situation in the countries mentioned, one arrives at the following conclusions:

1. Game research entirely or largely financed through game licence revenues:

	Game research annual expenses	Game Fund contribution % of annual revenue
Denmark . . . . .	200-250.000 d. kr.	(12-16)
On deducting profit made by		
Kalø Exp. Farm. . . . .	ca. 115.000 d. kr.	7-8
Finland . . . . .	190-220.000 d. kr.	10 (-15)
France . . . . .	255-375.000 d. kr.	0.6-0.8
Holland . . . . .	ca. 150.000 d. kr.	5-6
Norway . . . . .	ca. 146.000 d. kr.	10
Sweden . . . . .	210-255.000 d. kr.	8-10

On recalculating the contribution to game research made by the Danish Game Licence Fund it will be found that the capital expense amounts to the value of two cartridges per sportsman.

2. Countries where the cost of game research is largely covered through Government grants and licence revenues:

West Germany  
Yugoslavia.

3. Game research largely financed through Government grants:

East Germany.

4. Game research financed through Government grants and private contributions:

Austria  
(Great Britain).

5. Game research largely financed through private contributions:

Great Britain.

It must be admitted that the categories are not able to depict in detail the actual situation but they present an outline. Also it has not been possible to estimate the total cost of game research in the latter four groups of countries.

*C. Current research activities.*

AUSTRIA. Food situation and game density; salt demand in deer in relation to barking activity. Großraumplanung for Red Deer. Studies on predators (bear, lynx, and wild cat). Possibility of restoring an Austrian population of Ibex. Biology of the marmot. Possibility of encouraging hare and partridge to settle in woodland in areas where agriculture expands. The problem of declining population of quail.

DENMARK. The chief activity of the Game Research Station is to do basic research on populations of various game species (population size, age class distributions, sex ratio, rate of reproduction, growth, turnover etc.). Population fluctuations and climatic factors etc. Studies on the proper economic balance between game population and size of area (especially the relationship between deer and field and forest). Studies on the effect of planting, forage fields, supplementary food supply, and chemical and mechanical means of reducing deer damage. The work of the Station is chiefly concerned with hares, roe deer and red deer, pheasants, partridges and mallards (one problem is the possibility of encouraging the mallard population). Studies on eiderducks, geese and damage done by geese are also in progress. The Station is also responsible for rabbit control in South Jutland. – The Zoological Museum in Copenhagen carries out studies on the food of game species (deer, swans and others) and animal parasites of game. – The Veterinary Serum Laboratory, Copenhagen, carries out research on game diseases.

FINLAND. Chief aspect of game research is to prevent or reduce population decline in game species. Studies on the importance of environmental factors. Work concerning population fluctuations in progress. Dependence of game on climate—game and environment—game enemies (vermin)—game diseases—food of game—biology of capercaillie and black grouse—duck problems. Extensive bird-banding serves several purposes.

FRANCE. Chief items are: myxomatosis, tularaemia, partridge diseases, the effect on game of certain agricultural sprays. Rearing and release of partridge, red-legged partridge and chukars. Experiments on the reintroduction of moufflon and mountain goat.

EAST GERMANY. Game research is in the process of being developed. Special attention is paid to problems of game disease, game marking, countermeasures against game damage and certain aspects of small game.

WEST GERMANY. Game research is chiefly concentrated on roe deer, hare, Tetraonids and the decline of small game. Plant protection and the prevention of game damage is also studied.

GREAT BRITAIN. I.C.I. is chiefly concerned with partridge and pheasant and their welfare while the Scottish Station concentrates on Grouse. – The Wildfowl Trust specializes on Anatidae. – Nature Conservancy also is taking interest in red deer.

HOLLAND. Department of Game Management: Control of harmful game, acoustic repellents, bag-records for various species, especially those for which a

premium is paid or a special licence required. I.T.B.O.N.: Chemical repellents, research on waterfowl, partridge, pheasant and black grouse. Food investigations (especially of red deer and roe deer). Investigations on stock of roe deer in different types of country.

NORWAY. The rapid expansion of game management in Norway necessitates simultaneous scientific work in many fields. Work is being done on reindeer, fox, grouses and vermin.

POLAND. Deer-damage and repellents as well as carrying capacity of certain areas are studied. Various questions concerning the biology of hares, red deer, roe deer and partridge are on the programme.

SWEDEN. A distinguishing feature of Swedish game research is the study on elk and the damage to field and forest caused by it. Other subjects are: Capercaillie and black grouse, analysis of population fluctuations in ducks, current examination of diseased and malformed animals and animals found dead or dying. Effort to combat gulls. Effect of poisonous agricultural sprays on game. Marking of mammals and birds.

YUGOSLAVIA. Chief emphasis at present on red deer (races, distribution, damage), pheasant (rearing and release), studies on the carrying capacity of various habitats and their suitability for different game species.

#### Summary of research activities.

The current research activities taking place in the countries considered can—on the basis available—be summarized as follows:

*Problems partly caused by excessive game density:* Damage to field and forest caused by game and possible countermeasures are being studied in Austria, Denmark, Finland, France, East Germany, West Germany, Holland, Norway, Poland, Sweden and Yugoslavia. The chief problem is deer damage (red deer, roe deer, and elk) but also damage caused by e.g. rabbit and hare may become a problem of importance. In some places (e.g. Sweden) it has been found desirable to bring about a reduction in numbers of gulls. (See e.g. Report on Wildlife Repellents, Inst. Toegepast Biologisch Onderzoek in de Natur, Arnhem, 1957).

*Problems concerning decline and fluctuations of game populations.* Decline of quail in Austria, of ducks in Denmark, Finland, Great Britain, Holland and Sweden, of small game in West Germany. Fluctuations are being studied especially in Denmark, Finland, West Germany and Norway.

*Introduction or immigration of new game species.* In France studies are in progress concerning chukar and red-legged partridge, moufflon and mountain goat. In Austria the status of Ibex and marmot is followed in detail.

*Rearing and release of game.* A research approach to problems of this type is used in several countries e.g. Denmark, France, (West Germany), Great Britain, Holland, Sweden and Yugoslavia.

*Research on Vermin control.* Special attention to this is noted from Austria, Finland, Holland and Norway.

*Adaptation of game to habitat.* Special study of this problem is made in Denmark, Finland and Yugoslavia but the problem is realized in the working programme of practically all countries.

*Population dynamics of game.* Denmark (hare, roe deer and pheasant), Holland (roe deer).

*Agricultural sprays and the game.* Quoted as a special subject in Denmark, France, Holland and Sweden but considered in several countries.

*Game diseases.* This question forms part of the research programme in most countries.

*Biology of individual game species:*

Red deer: Austria, Denmark, Great Britain, Holland, Norway, Poland, Yugoslavia.

Roe deer: Denmark, West Germany, Holland, Poland.

Elk: Sweden.

Reindeer: Norway.

Hare: Austria, Denmark, West Germany, Poland.

Marmot: Austria.

Partridge: Austria, Denmark, France, Great Britain, Holland, Poland.

Pheasant: Denmark, France, Great Britain, Holland, Yugoslavia.

Capercaillie and Black Grouse: Finland, Holland (Black Grouse), West Germany and Sweden.

Grouse: Great Britain, Norway.

Quail: Austria.

Ducks: Denmark, Finland, Great Britain, Holland, Sweden.

The International Union of Game Biologists offers an opportunity to coordinate research in different fields in such a way that, already during the planning stage, published or unpublished results, experiences or methods obtained elsewhere can be drawn upon and taken into consideration. It should be mentioned here that the Scandinavian game biologists have taken the practical step of dividing the labour concerning studies on the biology of certain gallinaceous birds.

Similar plans have been worked out concerning waterfowl. There can be no doubt that an effort to extend this practical cooperation to the entire area covered by our Union would prove most profitable.

*D. The general position of game research.*

AUSTRIA. With the exception of Ö.A.f.W. game research has no central coordination. The cooperation between the institutes under Ö.A.f.W. is efficient while the contact between research and sporting organization is not yet quite satisfactory. On several occasions the authorities have asked the Ö.A.f.W. for an opinion on questions concerning game, on the other hand it has not yet been possible to introduce rational and uniform close-time regulation in all provinces.

The spread of information on results obtained by game research takes place through the annual meeting of the Association, through game periodicals and through lectures and courses.

DENMARK. In practice the centre coordinating Danish game research consists of the Board of Administration of Kalø Game Research Station supplemented by two research representatives. This committee is headed by the Permanent Under Secretary of State in the Ministry of Agriculture, while the other members represent the Game Council, Sportsmens' Organizations, the Game Advisory Service and biological research. The Game Council, also acting as the Executive Committee for the Estate Kalø, consists of three game organization representatives. It acts as an advisory committee to the Ministry of Agriculture in questions concerning game and the administration of The Game Licence Foundation. The final decision rests with the Ministry of Agriculture. Close contact with the Game Council and the Game Advisory Service has gradually created a fruitful cooperation between game organizations and research in Denmark. Also the authorities make increasing use of the results, experience and assistance offered by game biologists.

The latest results in game research are brought to the attention of the public, and especially to the sporting public, through a monthly article in all Danish game periodicals, and through occasional articles of greater length. The Game Research Station issues a publication of its own, "Danske Vildtundersøgelser" which contains research reports, detailed but still popular. Since 1954 these publications have been sent free on application, the circulation being about 10.000.

In Denmark we enjoy a close cooperation between game biologists and the Game Advisory Service, a special organization sustained by the Game Licence Fund. Between them 12-14 Game Advisers, headed by The Chief Game Warden,

cover the entire country (one Game Adviser being in charge of shore and inshore shooting); one task of the game adviser is to inform the practical sportsman of the latest results of game research as regards game management. It is now compulsory that in order to become a game adviser one should have practical game experience followed by 10 months of practical and theoretical training at the Kalø Game Advisers' School and one year spent as a Game Adviser Trainee (assistant) at Kalø. To a large extent films are now being used for the public educational activity of the Game Advisers. A film about the Kalø Game Experiment Farm and its activity is part of the film programme.

The scientific results of game research are published in the usual game biology journals, among which "Danish Review of Game Biology" contains most Danish reports.

FINLAND. In support of the Game Research Institute is a consulting council in which various organizations and organs for collecting research material are represented. The Game Research Institute is affiliated to the University of Helsinki. Through this connection it becomes possible to draw also upon students for game research work.

The Game Research Institute has no decisive influence upon close-time regulations etc. but it often prepares detailed recommendations upon which the annual regulations are usually based by the Ministry of Agriculture.

As towards the Finnish game organizations the game research enjoys rather free hands. Game organizations may make proposals to the Institute but have no decisive influence upon the action taken by the Institute.

The practical results of game research are published in "Suomen Riista", a semi-popular magazine issued by the Game Research Institute. The other series issued by the Institute, "Papers on Game Research" is reserved for the scientific papers. In addition the Institute offers an information service to newspapers, game magazines and radio, and many visitors come to the stations run by the Institute.

FRANCE. French game research is coordinated through Conseil Supérieur de la Chasse (C.S.C.) which was established pursuant to an Act of 1941. The Conseil represents the authorities, the official game organizations and research. C. S. C. not only deals with research but also administers the game licence revenues for game purposes.

The game research cooperates with other organizations (game associations, ornithological associations etc.) in order to obtain material for research purposes. Close-time and other regulations are being influenced by the C.S.C. to the extent that current research activities throw light upon the points brought up for

discussion. Sporting associations have very slight influence upon the planning of game research.

The popularization of research reports takes place through direct information to the authorities, to sporting associations etc. through the C.S.C. Bulletin and through the press and sporting magazines.

**EAST GERMANY.** The coordination of game research takes place through the Arbeitsgemeinschaft für Wildforschung der Deutschen Akademie der Landwirtschaftswissenschaften in cooperation with the Obersten Jagdbeirat. The recommendation is put before the Ministerium für Land- und Forstwirtschaft with whom rests the final decision.

Cooperation between game research and other organizations is established in each case (with Vogelwarten, Naturschutzverwaltung, Veterinärwesen etc. as the case may be). Cooperation with sporting organizations takes place in so far as the organizations give support to the solution of the problems. The organizations may also suggest that research be done on certain problems but they have no influence upon the extent to which the recommendation is followed.

The opinion of game biologists is occasionally called upon by the authorities when game regulations are brought up for discussion.

Popular and semi-popular game research reports are published through Merkblätter der Arbeitsgemeinschaft für Wildforschung der DAL, through lectures and through films. The scientific results are published in the appropriate journals.

**WEST GERMANY.** There is no centre of coordination for game research. Game research and sporting organizations cooperate to obtain research material etc. Financial support for the solution of certain problems may be had from sporting organizations and Stifterverband.

On request the game research supplies information to the authorities. As regards game regulations the delegates from Deutsche Jäger Verband in Bonn are competent.

The results of game research are brought to the attention of sportsmen through sporting magazines, Zeitschrift der Jagdwissenschaft, Merkblätter der Deutschen Jagdschutzverband etc. Lectures are given and questions answered on request.

**GREAT BRITAIN.** No centre for coordinating game research. There is good cooperation between game research, the Nature Conservancy and various laboratories, veterinary, agricultural and forestry departments, hence good, privately established, contacts are available. As far as the work done under I.C.I. is concerned, the sporting associations have no influence. The results from the I.C.I. station are published in farming and shooting papers, informative



booklets (28.460 are distributed annually), visitors to the Game Research Station (500 a year). "Educational" meetings for hunters and farmers are supported by films and lantern slides. - The Wildfowl Trust maintains co-ordination and balance between (1) the ornithologists, (2) the shooters, and (3) the Governments body dealing with conservation: The Nature Conservancy.

HOLLAND. No official centre of coordination but good co-operation. Game research also cooperates with most duck netters and decoy owners and netters of Golden Plover.

Through the Game Fund the sporting associations have in certain cases influence on the planning of game research.

The results of game research are made known through journals, and through written and verbal communications.

NORWAY. A committee (Udvalget for Viltforskning) cooperates with the Norwegian State Game Research with a view to coordinating efforts. As a consequence of a recent reorganization of Norwegian Game Research the co-operation with other organizations (sporting etc.) has not yet become fully efficient, but attempts are made to develop it. The sporting organizations have no real influence on game research planning but on the other hand research will always listen to suggestions made and discuss matters.

The game research has advisory status with the authorities e.g. in connection with close-time regulations, the preparation of acts and regulations concerning game and hunting.

The results are published through journals and lectures. Attempts are being made to expand this activity.

POLAND. No special coordination center of game research. In certain cases the Polish Sportmens' Associations will deliver material and funds for investigations. The Polish periodical on Game and Shooting (Lowiec Polski) presents the results of game research. Game research specialists are heard when questions concerning game and shooting are dealt with by Government authorities e.g. The Nature Conservancy Council.

SWEDEN. Game research in Sweden is coordinated by The Game Research Council which consists of the Head of The State Veterinary Medical Institute, the professor of forest zoology (including game management) at The Royal School of Forestry, and representatives of State authorities concerning Forestry, Agriculture and Veterinary Medicine; furthermore The Swedish Sportsmens Association and Zoological Institutions are represented. The Council serves the purpose of promoting coordination of efforts and development of research efficiency.

The authorities pay attention to the recommendations given by game research e.g. concerning close-time regulations. Alongside with game research also the sportsmen, Conservation, Agriculture and Forestry may have influence on the final decision taken by the authorities.

Research reports are published in various journals, first and foremost in the journals issued by The Swedish Sportsmens Association (Svensk Jakt and "Viltrevy").

YUGOSLAVIA. Coordination of Yugoslavian game research is in the process of being developed through appointment of a scientific staff associated with the Federal Hunters' Association. This staff is supposed to plan research on basic problems. The Hunters' Association—and through it the State—should provide financial support to the programme. The further organization of this joint work is supposed to take place through the Game Research Institute in Beograd although also in the future work on the individual problems will be centered in the individual institutes of the country.

Modern game research is in the process of being developed, hence its influence is limited as yet.

*Conclusions as regards the general position of game research.*

The mutual coordination of game research organs through a centre which also contacts the sportsmen has been practiced somewhat differently in the countries considered.

In Austria the private organization Ö.A.f.W. has undertaken a coordination of game research activities while a fully efficient contact with the sporting public has not yet been created.

The following countries have a "Game Council" of some description which speaks on behalf of sportsmen and possibly other groups:

Denmark  
Finland  
France  
(East Germany)  
Holland  
Norway  
Sweden.

Countries without centres of coordination are:

West Germany

Great Britain  
Poland  
Yugoslavia.

Generally the value of having country-wide organs for game research, be it special institutes or organs associated with other institutions, must be stressed. In this connection one should not underestimate the value of close contact between game research and Universities.

It is, however, most important that game research is not under obligation to confine itself to problems of practical game management and that, to a considerable extent, it is given possibilities for doing basic research. This provides the only sound basis for rational progress in practical game management.

It is therefore felt, that game research should be given a certain measure of freedom under some understanding authority which provides the necessary means without pressing the research to do work along particular lines; it is known from other fields of research also that this gives the best guarantee for a promising development.

Good contact with the sportsman, and with sporting and other organizations concerned with game and land is certainly important not only for obtaining information and research material but also for a satisfactory spread of the results arrived at by game research, results which under given circumstances may become important for introducing a rational and practical approach to game management.

Likewise great importance must also be given to the presence of a highly qualified staff of game advisers in close contact with research as well as with the practical sportsman. As regards the spread of information on the progress of game research it is probably true that most countries have not yet found an ideal and efficient solution.

WEDNESDAY, 16 OCTOBER

METHODEN ZUR REGISTRIERUNG DER JÄHRLICHEN  
SCHWANKUNGEN DES WILDBESTANDES UND DES JAGD-  
ERTRAGES IN MEHREREN EUROPÄISCHEN LÄNDERN

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Die Bedeutung, die der Kenntnis von Größe und Veränderung des Wildbestandes und des Jagdertrages zukommt, hat in den meisten Ländern dazu geführt, Methoden zur Klärung dieser Fragen auszuarbeiten. Obwohl diese Methoden von Land zu Land gewisse gemeinsame Züge aufweisen, sind die Verfahren doch so verschieden, daß es bei einer Erörterung wie dieser angebracht sein dürfte, eine Einteilung nach Gruppen vorzunehmen.

Das Material, das diesem Bericht zu Grunde liegt, besteht aus den in einem Fragebogen enthaltenen Antworten, einem Fragebogen, der in Länder verschickt wurde, die der Internationalen Ring der Jagdwissenschaftler angeschlossen sind. Folgenden Beiträgern möchte ich meinen besten Dank aussprechen: Dr. D. Amon (Austria), Dr. L. Siivonen (Finland), Mr. G. Pringalle (Frankreich), Professor, Dr. H. Gäbler (D.D.R.), Professor, Dr. F. Nüsslein (D.B.R.), Mr. C. L. Coles, Dr. T. Blank, V. P. W. Lowe, Dr. G. V. T. Matthews (England), Mr. W. J. Schuitemaker (Holland), Dr. Y. Hagen (Norwegen), Professor, Dr. D. J. Tilgner und Dipl.Ing. E. Frankiewicz (Polen), The Game Research Council (Schweden), und Professor, Dr. Stane Valentincic (Jugoslawien).

Die Darstellung, die ich hier gebe, beschränkt sich auf bestimmte Teile des gewonnenen Materials. Weitere Auskünfte über die Verhältnisse in den einzelnen Ländern ergeben sich aus den einzelnen, beigefügten Beantwortungen der Fragebogen.

A.

Länder, die in Bezug auf alle gewöhnlichen Wildarten eine zahlenmäßige Übersicht über den gesamten Jagdertrag ihres Gebietes und seine von Jahr zu Jahr stattfindenden Änderungen anstreben.

Zu dieser Gruppe sind in erster Linie zu zählen:

Österreich,  
Dänemark,  
Westdeutschland,  
(Ostdeutschland),  
Holland,  
Polen,  
Jugoslawien.

In diesen Ländern wird den Behörden nach jeder Jagdsaison angegeben, wieviel Wild von jeder Art erlegt worden ist. Die Methode zur Ermittlung dieser Zahlen mag verschieden sein, sie erfaßt aber schließlich all oder jedenfalls doch die meisten Jäger, die in dem betreffenden Jahr einen Jagdschein gelöst haben.

Man hat den Wert dieser Angaben über die Jagderträge oft bestreiten wollen, und natürlich gibt es dabei manche Fehlerquellen. In Dänemark liegt Kontrollmaterial vor, das den Verlauf der Veränderungen des Jagdertrages von Jahr zu Jahr beleuchtet. So zeigen die ausführlichen Jagdjournale bestimmter Güter, die ohne jede Hinsicht auf die Wildstatistik geführt sind, eine – auch statistisch verlässliche – Übereinstimmung mit den Variationen, die in dem wildstatistischen Material erscheinen, das auf amtlichem Wege ermittelt ist. Auch die umfassende Spezialanalyse von Jagderträgen auf vielen kleineren Landbesitzen hat in Dänemark sehr schöne Übereinstimmungen mit der offiziellen Statistik ergeben. Es scheint daher grundsätzlich kein berechtigter Zweifel an dem Wert der Angaben über den Wildertrag, die von dem einzelnen Jäger oder Revierbesitzer gemacht werden, erhoben werden zu können.

Einige der von mir genannten Länder benutzen, wie ich schon andeutete, eine andere als die soeben beschriebene Methode zur Beobachtung des Wildbestandes und des Jagdertrages. Bestandaufnahmen auf besonderen Gebieten, die meistens bestimmten Arten gelten, oder die Sammlung anderer, zum Teil schätzungsweiser Angaben werden oft als ergänzendes Material verwendet.

Die Länder, welche diese Registriermethode verwenden, können nicht alle mit Zahlen aus längeren Zeiträumen aufwarten. Am weitesten gehen die Beobachtungen in Österreich zurück, wo seit dem Ende des vorigen Jahrhunderts umfassende Analysen des Wildertrages vorgenommen werden. – Dänemark hat seit 1941 eine Wildstatistik, die auf Fragebogen beruht, welche jeder Jäger bei der Erneuerung seines Jagdscheines abgibt. – Westdeutschland führte von 1934 bis 1939 und führt nun wieder seit 1953 (unvollständige) und seit 1955 (vollständige) wildstatistische Erhebungen nach den vorhin angegebenen Hauptrichtlinien durch. – Ostdeutschland, dessen Wildforschung und Jagdorganisation

zur Zeit ausgebaut werden, arbeitet nach ähnlichen grundsätzlichen Richtlinien, kann aber noch keine Ergebnisse vorlegen. – Holland beginnt erst 1956–57 mit wildstatistischen Feststellungen, die sich auf Fragebogen gründen, welche von allen Jägern abgegeben werden. – In Jugoslawien gibt es mit ganz vereinzelt Ausnahmen in allen föderalen Republiken Systeme, wodurch die Jagdausbeute der einzelnen Jäger registriert wird. In einigen Republiken gehen bestimmte Aufschlüsse bis zum Anfang des 19. Jahrhunderts zurück.

Es ist schwierig, auf Grund des eingesandten Materials Zahlen zum Vergleich des gesamten Jagdertrages der betreffenden Länder aufzustellen. Die Auskünfte sind in mancher Beziehung ungleichartig, und man müßte sie möglichst bald zu koordinieren suchen. Hier ist wieder eine Aufgabe, durch deren Bearbeitung der Ring der Jagdwissenschaftler zur Erzielung von gleichartigeren und daher brauchbareren Verfahren beitragen könnte.

Unter dem Vorbehalt, den die Art des Materials bedingt, mag es bei dieser Gelegenheit doch von Interesse sein, zu sehen, welche Zahlen für Wildarten vorliegen, die den Statistiken folgender Länder über erlegtes Wild gemein sind.

Mehr als ganz grobe Richtlinien kann eine derartige Zusammenstellung natürlich nicht geben. Die (eingeklammerten) Zahlen aus Westdeutschland sind zweifellos viel zu niedrig. Man stellt indessen folgendes fest: Während der Ertrag der betreffenden Wildarten je Jäger in den vier Ländern ziemlich gleichartig ist, zeigt der Ertrag in Polen eine beträchtliche Abweichung. Betrachtet man den Ertrag pro 100 ha hat Dänemark einen fünf- bis zehnmal größeren Wildertrag je Arealeinheit als die anderen Länder. Etwas Ähnliches findet man, wenn man den reziproken Wert des Verhältnisses von Areal zu Jäger (wobei nicht nur das Jagdareal, sondern die gesamten Bodenfläche des Landes gemeint ist) als einen gewissen Ausdruck für die Jagdintensität und die Wilddichte nimmt.

Dänemark (42,5 ha je Jäger) . . . . .	1:1
Österreich (etwa 140 ha je Jäger) . . . . .	etwa 1:3½
Westdeutschland (etwa 188 ha je Jäger) . . . . .	- 1:5
Jugoslawien (etwa 257 ha je Jäger) . . . . .	- 1:6
Polen (etwa 866 ha je Jäger) . . . . .	- 1:20

Könnte man schließlich zu einer Koordination der wildstatistischen Angaben aus den einzelnen Ländern gelangen, so ergäben sich nach dem Gesagten wohl nicht nur interessante Möglichkeiten zur Beleuchtung der Jagdverhältnisse, sondern derartiges Material dürfte auch in nicht geringerem Maße ökologische Perspektiven von beträchtlicher Bedeutung eröffnen. Bei dieser Gelegenheit, wo nur unvollkommenes Material zur Verfügung steht, soll jedoch nicht versucht

Tabelle 1. Jährlicher Jagdertrag.

	Dänemark je Jahr 1941-54	A. Deutschland D. B. R. 1953-54	B. Deutschland D. B. R. <sup>2)</sup> 1954-55	Österreich 1955	Jugoslawien Jahres- durchschnitt	Polen 1956
Rotwild . . . . .	530	16 000	14 500	21 093	635	7 500
Rehe . . . . .	17 000	125 000	235 800	87 065	3 570	23 000
Hasen . . . . .	383 000	550 000	361 200 <sup>3)</sup>	256 218	680 000	463 000
Füchse . . . . .	25 200	155 000	103 900 <sup>1)</sup>	27 207	47 100	12 920
Fasane . . . . .	317 200	120 000	100 600 <sup>4)</sup>	96 606	21 220	1 800
Rebhühner . . . . .	305 200	280 000	175 200 <sup>3)</sup>	77 817	67 900	222 000
Insgesamt je Land . . . . .	1 048 130	1 246 000	991 200	566 006	820 425	730 220
Bodenfläche des Landes . . . . .	43 000 km <sup>2</sup>	245 770 km <sup>2</sup>	245 770 km <sup>2</sup>	83 850 km <sup>2</sup>	256 880 km <sup>2</sup>	311 730 km <sup>2</sup>
Wildertrag je 100 ha . . . . .	etwa 24	5	(etwa 4)	etwa 4.8	etwa 3.2	2,3
Anzahl der Jäger . . . . .	ca. 101 400		136 850	ca. 60 000	ca. 100 000 (?)	36 000
Jägeranzahl in % der Gesamtbevölkerung . . . . .	ca. 2.3 %		ca. 0.26 %	ca. 0.85 %	ca. 0.6 %	0.1
Bodenfläche je Jäger . . . . .	ca. 42 ha		ca. 188 ha	ca. 140 ha	ca. 257 ha	866 ha
Von den angeführten Wildarten je Jäger erlegt . . . . .	10.3 Stck.	9.9 Stck.	(ca. 7.2 Stck.)	ca. 9.4 Stck.	ca. 8.2 Stck.	20,2 Stck.

1) auch Dachse. 2) Diese Zahlen, die teilweise durch Schätzung die Verhältnisse in ganzer D.B.R. zu ergeben versuchen, wird von v. Freier in »Jagd u. Hege aller Welt« p. 98 (1955) mitgeteilt. 3) ÷ Bayern und Niedersachsen. 4) ÷ Niedersachsen und Hessen.

werden, das Thema eingehender zu behandeln. Hervorgehoben sei nur, daß die hier beschriebene Form der Wildstatistik die größte Aufmerksamkeit verdient.

Durch die dargestellte Registriermethode erhält man nicht nur einen quantitativen Ausdruck für den Umfang der Jagd in einem bestimmten Gebiet. Verfolgt man die Zahlen von Jahr zu Jahr, so bekommt man Diagramme, die eine quantitative Grundlage für Studien über die Schwankungen des Wildbestandes geben, die z.B. im Hinblick auf die Analyse ursächlicher Zusammenhänge mit der Veränderung gewisser äußerer Umstände verglichen werden können. – Sollen indessen die Ertragszahlen von einem Jahr die Grundlage bilden, die – in vergleichender Zusammenstellung mit Studien über die Verhältnisse der folgenden Setz- und Brütezeit und die entsprechende Beschaffenheit des Wildbestandes – zur Beurteilung der Aussichten für die kommende Jagdsaison dienen kann, so ist es notwendig, daß die von den Jägern abgegebenen Antworten oder jedenfalls doch ein in statistischer Hinsicht genügend großer Teil davon behandelt werden können, bevor zu etwaigen Schonzeiten oder anderen Maßnahmen Stellung genommen werden soll. Das kann Schwierigkeiten verursachen, die man z.B. in Dänemark eben erst jetzt überwindet.

#### B.

Länder, die – hauptsächlich auf Grund von Schätzungen – für alle gewöhnlichen Wildarten die Größe des Bestandes und allenfalls auch des Jagdertrages im Verhältnis zu einem mittleren Wert zu bestimmen und anzugeben suchen, ob der Bestand von Jahr zu Jahr stationär ist oder ob er steigende oder abwärts-gleitende Tendenz hat. Dieses System beruht meistens auf Meldungen von Berichterstattern aus allen in Frage kommenden Landgebieten.

Länder, die dieses System benutzen, sind

Finnland,  
Schweden,  
Norwegen,  
Frankreich.

Es muß jedoch stark betont werden, daß man auch in diesen Ländern oft ergänzende Methoden gebraucht, die entweder in einem gewissen Umfang Verfahren wie die unter A beschriebenen anwenden oder unmittelbare Bestandsaufnahmen in bestimmten Bezirken durchzuführen suchen. Auch aus der Auszahlung von Abschlußprämien u.ä. läßt sich der Ertrag gewisser Wildarten verfolgen. Die Grenze zwischen den Gruppen A und B ist also nicht scharf.

Wendet man sich indessen der unter B angeführten Methode zu, die nach den Schätzungen einer Reihe von Berichterstattern über Größe und Veränderung



der Bestände Auskunft gibt, so ist auch von diesem Verfahren zu sagen, daß es seine Verteidiger und seine Angreifer hat. Schätzungen sind – nicht zuletzt, wenn es sich darum handelt, die Größe von Beständen zu schätzen – eine heikle Angelegenheit.

Andererseits muß betont werden, daß die Berichterstatter-Systeme, die z. B. in Finnland, Norwegen und Schweden verwendet werden, auf eine Weise ausgebaut sind, die sich nicht durch einen Fragebogen ersetzen läßt, bei dessen Ausfüllung der einzelne Jäger einmal jährlich nur über seine Jagdausbeute berichtet. Die Berichtssysteme der genannten skandinavischen Länder geben nämlich die Möglichkeit, zwei- bis dreimal jährlich Berichte über den Zustand zu erhalten (z. B. beim Übergang vom Februar zum März, am 1. Juli und am 1. Oktober), und diese Berichte lassen sich so variieren, daß eine Anzahl der Faktoren, die bei der Bewertung der Größe und der Veränderungen des Wildbestandes Bedeutung haben, gleichzeitig beleuchtet wird. Für eine Beurteilung der Aussichten für die kommende Jagdsaison kann es von wesentlicher Bedeutung sein, ein möglichst detailliertes Bild von der Lage zu haben, nicht zuletzt in den nordischen Ländern, wo die Schwankungen des Wildbestandes sehr ausgeprägt sind.

Finnland verwendet das genannte Berichterstatter-System (das 650 Binnenland- und 100 Küstenbezirke umfaßt) seit 1928 und seit 1945 in reorganisierter Form. Es erstreckt sich auf alle gewöhnliche Arten. Unabhängig hiervon erstatten alle Jäger bei der Erneuerung ihres Jagdscheines Bericht über gewisse Niederwildarten. Außerdem liegen im Zusammenhang mit den Abschlußprämien Berichte über bestimmte Pelzwildarten und über Elche vor. In besonderen Bezirken führt die Wildforschung Spezialanalysen des Entenbestandes durch.

Norwegen hat seit 1930 ein das ganze Land umspannendes Berichterstatter-System, das jetzt in neugestalteter Form etwa tausend Berichterstatter umfaßt; diese sind den "Jagdämtern" ("Viltnevn") angeschlossen, die es in jeder Gemeinde gibt. Geschätzt wird teils die Größe des Bestandes, teils der Jagdertrag. Die einzelnen Jäger erstatten den Behörden keinen direkten Bericht über ihre Jagdausbeute. Gewisse Wildarten, z. B. Rene, werden gesondert gezählt.

In Schweden geben die Erwerber von Jagdscheinen nicht unmittelbar eine Erklärung über ihren Jagdertrag ab. Die Hauptmethode bei der Beurteilung des Wildbestandes ist ein Berichtssystem, das kürzlich reorganisiert worden ist. Es entspricht im Prinzip dem finnischen und norwegischen und umfaßt eine beträchtliche Anzahl von Fragen. Bei einzelnen Arten (Elchen, größeren Raubtieren und ähnlichen) werden Zahlen angegeben, sonst nur Schätzungen.

In Frankreich stellen die Behörden den amtlichen Jagdorganisationen der Regierungsbezirke Fragebogen zu. Diese Stellen erstatten dann auf Grund von

eingeholten Auskünften Bericht über den Wildbestand. Die Auskünfte beruhen teils auf Schätzungen, teils – besonders in Bezug auf die größeren Wildarten in den Reservaten – auf genaueren Bewertungen der Bestände. Bei Enten u. dgl. werden in bestimmten Versuchsgebieten Sonderzählungen vorgenommen. Die Ergebnisse kommen im allgemeinen nicht zahlenmäßig zum Ausdruck.

C.

Zu einer dritten Gruppe ist England zu zählen, von wo Mitteilungen über die Methoden vorliegen, welche die Wildforschungsstation der I.C.I. anwendet, um die Veränderungen der Rebhuhnbestände zu verfolgen. Mit Hilfe des eigenen Stabes der Station werden hier sehr genaue Analysen der Rebhuhnbestände durchgeführt, und zwar der Bestände in einer begrenzten Anzahl von Revieren (12 von insgesamt 25.–30.000 acres), die in verschiedenen Teilen des Landes liegen. Ergänzende Angaben werden außerdem von einer beträchtlichen Anzahl von Jägern geliefert. Zu wiederholten Malen analysiert man Größe und Zusammensetzung der Bestände und auch die Jagdausbeute in einer Weise, daß man u. a. eine gute Grundlage bekommt, um zu beurteilen, welchen Abschluß man sich gestatten kann, wenn die Jagd aufgeht. Die Analysen erfolgen seit 1947 in dem eigenen Gebiet der Station, seit 1951 auch in außerhalb gelegenen Revieren. Die Ergebnisse, die man auf diese Weise zur Erforschung der Populationsdynamik einer Wildart und ihrer Abhängigkeit von gewissen äußeren Umständen erzielt hat, sind in hohem Maße nachahmenswert.

Nach dieser summarischen Behandlung der eingesandten Auskünfte über die Methoden, die man in den verschiedenen Ländern zur Beurteilung der Größe und der Veränderungen des Wildbestandes und des Jagdertrages anwendet, mag es verlockend sein, nach bestimmten Richtlinien zu suchen, die als Wegweiser für weitere Erwägungen dienen könnten.

Meiner Ansicht nach gibt keins der drei besprochenen Verfahren allein der Wildforschung völlig befriedigende Belehrungen für das ein ganzes Land umfassende Studium der Veränderungen des Wildbestandes und des Jagdertrages und für eine Beurteilung der zweckmäßigsten jagdlichen Nutzung der Bestände.

Wie man es bereits in manchen Ländern tut oder zu tun versucht, wäre es tatsächlich am zweckmäßigsten, die drei Methoden nebeneinander anzuwenden. Durch Berichte der Erwerber eines Jagdscheines erhielt man quantitative Angaben über den Jagdertrag. Durch die Verwendung von Fragebogen, die jährlich zwei- bis dreimal einem Kreis fester – nach Möglichkeit hochqualifizierter – Berichterstatter im ganzen Land zuzuschicken wären, bekäme man einen Eindruck von der von Ort zu Ort und von Jahreszeit zu Jahreszeit erfol-

genden Änderung der Zustände und Verhältnisse – und könnte auf diesem Wege auch Antwort auf etwaige Sonderfragen bekommen. Ergänzte man endlich diese zwei Hilfsmittel durch Studien forschungsmäßiger Art in ausgewählten Gebieten, die von Jahr zu Jahr genau beobachtet werden müßten, so dürfte es kaum zweifelhaft sein, daß sowohl die Wildforschung als auch die Jägerei eine wertvolle Grundlage bekämen, auf der sie bei Fragen, welche die Wildbestände und ihre Nutzung betreffen, weiterbauen könnten.

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## ANLAGEN

### AUSKÜNFTE AUS DEN EINZELNEN LÄNDERN

*Beantwortungen der herausgeschickten Fragebogen*

#### AUSTRIA

##### ERFASSUNG DER WILDBESTÄNDE UND DER JÄHRLICHEN WILDFÄLLUNG IN ÖSTERREICH

*Kustos Dr. R. Amon*

Graz

Dazu muß vorausgeschickt werden:

Die Bundesrepublik Österreich umfaßt *neun Bundesländer*.

Die Jagdbelange sind gemäß Bundesverfassung *Landessache*, daher beschloß jedes Bundesland sein Jagdgesetz, somit haben *neun Jagdgesetze* in Österreich Geltung.

Jedes dieser Landesgesetze bestimmt, daß alle zur Jagdausübung berechtigten Personen in einer *Landesjagdorganisation* als Körperschaft zusammengefaßt werden, somit bestehen in Österreich *neun gesetzlich anerkannte Landesjagdorganisationen* (als Landesjagd-Verbände, mit durch Verordnung der zuständigen Landesregierung festgelegten Statuten).

Zweimal jährlich findet, jeweils in einem anderen Bundesland, eine *Delegiertenkonferenz* der neun gesetzlich anerkannten Landesjagdorganisationen statt, in der auf Bundesebene jagdliche Belange abgesprochen werden.

1. Welche Methoden werden zur Herbeischaffung der Auskünfte benutzt?

Schon in der österreichischen Reichshälfte der österreichisch-ungarischen Monarchie waren für die Regelung jagdlicher Belange die behördlichen Ver-

waltungsbezirke (Bezirkshauptmannschaft) zuständig. Die Bundesrepublik Österreich gliedert sich derzeit in 85 Bezirkshauptmannschaften (im Burgenland und Kärnten je 7, in Niederösterreich 23, Oberösterreich 15, Salzburg 5, Steiermark 17, Tirol 8, Vorarlberg 3).

Jede dieser Bezirkshauptmannschaften bildet einen *Jagdbezirk*. Für die jagdlichen Belange in jedem Jagdbezirk ist dem Bezirkshauptmann der *Bezirksjägermeister* verantwortlich, der von der zuständigen Landesjagdorganisation gestellt wird.

Der Jagdbezirk gliedert sich in den meisten Bundesländern in *Hegegebiete*, denen ein *Hegemeister* vorsteht. Die Hegemeister sind die Vertrauensmänner des Bezirksjägermeisters; ihnen obliegt die Vorbereitung der von den Jagdberechtigten vorgelegten *Abschußpläne*. Auf Grund dieses Abschußplanes wird von der Bezirkshauptmannschaft der *Pflichtabschußplan* (Abschuß-Soll) für jeden Jagdberechtigtem festgesetzt.

2. Dieser Pflichtabschuß wird für jede Wildart in *Ziffern* zum Ausdruck gebracht.

3. In jenen Bundesländern, in denen vom Jagdberechtigten auch eine *Wildstandnachweisung* (für das Schalenwild der Frühjahrs-Wildbestand) mit dem Abschußplan vorzulegen ist, wird der Pflichtabschuß auch nach Geschlecht und Stärke festgesetzt, z. B. im Bundesland Steiermark. Dementsprechend wird auch die *Jagdstrecke* beim Schalenwild nach Geschlecht und Stärke in *Ziffern* zum Ausdruck gebracht, wozu im Bundeslande Steiermark auch der *Fallwildanfall* in *Ziffern* aufgezeigt wird.

4. Das "Österreichische Statistische Zentralamt" ermittelt im Herbst jedes Jahres aus den Jagdbezirkssummen des Wildabschlusses des Vorjahres eine *Statistik des Wildabschlusses* für ganz Österreich, u. zw. für die *Wildarten* wie in Punkt 5.

5. *Die Wildausbeute* in Österreich für das Jahr 1955:

Rotwild männlich . . . . .	7 537	Mufflon . . . . .	51
- weiblich . . . . .	13 556	Schwarzwild . . . . .	466
Damwild männlich . . . . .	10	Hasen . . . . .	256 218
- weiblich . . . . .	11	Wildkaninchen . . . . .	14 615
Rehwild männlich . . . . .	48 867	Murmeltiere . . . . .	3 369
- weiblich . . . . .	38 198	Füchse . . . . .	27 207
Gamswild männlich . . . . .	5 820	Marder . . . . .	1 352
- weiblich . . . . .	3 864	Wiesel . . . . .	5 975

Haselwild . . . . .	738	Wildgänse . . . . .	1 732
Schnepfen . . . . .	3 835	Bläß- u. Wasserhühner . . . .	1 047
Fasane . . . . .	96 606	Taucher . . . . .	340
Nußhäger . . . . .	7 613	Krähen u. Elstern . . . . .	83 925
Weihen . . . . .	694	Iltisse . . . . .	6 020
Bussarde . . . . .	4 757	Dachse . . . . .	3 234
Rebhühner . . . . .	77 817	Bisamratten . . . . .	1 938
Wachteln . . . . .	1 254	Auerwild . . . . .	1 748
Schnee- u.		Birkwild . . . . .	1 885
Steinhühner . . . . .	144	Habichte und Sperber . . . .	12 024
Wildtauben . . . . .	14 876	Fischreiher . . . . .	426
Wildenten . . . . .	16 286		

6. Das kleinste von der Wildstatistik erfaßte Areal ist der *Jagdbezirk* (siehe Punkt 1) mit Durchschnittsausmaß von  $1000 \text{ km}^2$ . Die Wildabschußstatistik für ganz Österreich erfaßt ein Areal von  $83.850 \text{ km}^2$ .

7. In Österreich üben rund  $60.000$  Menschen die Jagd aus (bei  $6.975.000$  Einwohnern in insgesamt  $4034$  Gemeinden zum Ende des Jahres 1955).

8. Die jährliche Ausgabe der Wildabschußstatistik erfolgt *seit Ende des vorigen Jahrhunderts* durch das Österreichische Statistische Zentralamt.

9. Die Wildabschußstatistik nimmt von der Bezirksverwaltungsbehörde (Bezirkshauptmannschaft) ihren Weg über die Landesbehörde (Landesregierung) zur Bundesbehörde (Statistische Zentralamt).

Eine weitere Ausnützung dieser Statistik könnte nur infolge der Landeshoheit in Jagdbelangen von der Landesregierung eines Bundeslandes erfolgen.

10. Wildstandsnachweise und Wildabschußstatistik können innerhalb eines Bundeslandes zur Festsetzung des Abschlußsolls, der Schon- und Schußzeiten dienen.

11. Der Österreichische Arbeitskreis für Wildtierforschung hat auf Grund der Wildstatistik z.B. die Arbeiten über das Rotwildvorkommen in Österreich in Beziehung zum gegebenen Standort in Angriff genommen (siehe Jahrbücher des Ö.A.f.W. 1956 und 1957).

12. Der Ö.A.f.W. hat seinerseits auch in Bezug auf Wildstatistik Verbindung und Gedankenaustausch mit Wissenschaftlern der Nachbarstaaten aufgenommen.

DENMARK

VERFAHREN ZUR BEURTEILUNG DER GRÖSSE DER WILDBESTÄNDE  
UND JAGDERTRÄGE UND DER VON JAHR ZU JAHR  
BEOBACHTETEN VERÄNDERUNGEN

Dr. H. M. *Thamdrup*

Als Bestandteil des Jagdscheines wird jedem Jäger ein Fragebogen ausgehändigt, worauf alle gewöhnlichen Wildarten verzeichnet sind. Dieser Fragebogen wird mit zahlenmäßigen Angaben darüber ausgefüllt, was der einzelne Jäger in dem vergangenen Jahr erlegt hat. Der Bogen wird bei der Erneuerung des Jagdscheines abgeliefert. Eine gesetzliche Pflicht zur Beantwortung der Fragen besteht nicht, doch werden die Auskünfte von den meisten Jägern erteilt.

In Dänemark gibt es kein – etwa dem finnisch-norwegisch-schwedischen entsprechendes – umfassendes Berichterstatte-System. Im Hinblick auf gewisse Wildarten, die unter Umständen durch besondere Hege geschützt werden müssen (Enten, Fasane, Rebhühner u.a.) holt der Leiter des Jagdberatungsamtes Berichte von den 12 bis 14 Jagdberatern (Game Advisers) ein, deren jeder seinen Landesbezirk hat. Seit vielen Jahren läßt auch der Dänische Jägerverband (Dansk Jagtforening) seine Kreisvertreter eine Beurteilung des Wildzustandes vornehmen (System: über Mittel, unter Mittel, sehr schlecht). Auch diese Berichte boten und bieten keine Hilfe bei der Beurteilung etwaiger Hegefragen.

Von der "Vildtbiologisk Station" werden auf Grund der sorgfältig geführten Jagdjournale mancher Güter und größerer Reviere Analysen der Schwankungen gewisser Wildbestände vorgenommen. Genannt sei eine soeben erschienene Veröffentlichung der Station: Magister J. Andersens "Studies in Danish Harepopulations. 1, Fluctuations" (Danish Review of Game Biology vol. 3, 1957). Auf dem Gebiet des Kalø Jagdhofes und auf einer kleinen Insel, die ausschließlich zu derartigen Analysen benutzt wird, überwacht die Station außerdem genau die von Jahr zu Jahr stattfindenden Veränderungen von Größe und Zusammensetzung bestimmter Wildbestände. Seit einigen Jahren werden die Hasenbestände gewisser Inseln und größerer Jagdreviere von Mitarbeitern der Station beobachtet.

Im Anschluß an The International Wildfowl Inquiry nimmt Dänemark in einer beträchtlichen Anzahl von Süßwasser- und Salzwassergebieten Zählungen vor.

Betreffs der Größe des Jagdertrages sei auf die umstehende Übersicht für die Zeit von 1941 bis 1952 verwiesen, welche die Zahlen für die Arten angibt, die registriert werden.

		1941/42-1951/52	
Rotwild . . . . .	496	Übertrag . . .	1.199.637
Damwild . . . . .	1.302	Schwimmenten . . . . .	350.427
Sikawild . . . . .	216	Tauchenten . . . . .	131.951
Rehwild . . . . .	16.144	Gänse . . . . .	9.451
		Möwen . . . . .	121.372
Hasen . . . . .	389.113	Andere Schwimmvögel . . .	20.721
Füchse . . . . .	22.709	Waldschnepfen . . . . .	17.517
Dachse . . . . .	2.918	Schnepfen . . . . .	43.169
Marder . . . . .	1.364	Brachvögel . . . . .	28.306
Otter . . . . .	230	Reiher . . . . .	3.497
Iltisse . . . . .	7.070	Andere Sumpfvögel . . . . .	27.855
Seehunde . . . . .	553		
		Krähen . . . . .	197.668
Rebhühner . . . . .	304.847	Elstern . . . . .	137.333
Fasane . . . . .	311.618	Saatkrähen . . . . .	71.893
Birkwild . . . . .	1.322	Raubvögel . . . . .	16.008
Tauben . . . . .	139.735		
	1.199.637	zusammen . . .	2.376.805

Die Anzahl der dänischen Jäger beträgt in dem betreffenden Zeitraum von zehn Jahren durchschnittlich etwa 105.000. Die gesamte Bodenfläche Dänemarks beträgt 43.000 qkm, die Bevölkerungszahl etwa 4,5 Millionen.

Die Sammlung der auf den Jagdscheinen enthaltenen Angaben wird von den Polizeibüros vorgenommen, die statistische Behandlung vom Statistischen Departement, der "Vildtbiologisk Station" und von Jagdorganisationen. Danach machen die Behörden von dem Material Gebrauch, das teils zur Beurteilung von Hegefragen u. ä., teils zu forschungsmäßigen Aufgaben benutzt wird. Die Wildforschung hat das Recht, gutachtliche Anträge einzureichen, die wildstatistische Fragen und deren Auswertung betreffen.

## FINLAND

### METHODS OF ESTIMATING THE VARIATIONS IN GAME POPULATIONS APPLIED IN FINLAND

Dr. *L. Siivonen*  
Helsinki

1. Which methods are used for obtaining the information?
  - a) Information from special observers distributed all over the country (= regular inquiries of the Game Research Institute). Species at present involved

regularly: bear, wolf, fox, samson fox, arctic fox, raccoon dog, badger, fisher, marten, weasel, polecat, "wild mink", European mink, wolverine, lynx, snow hare, European hare, squirrel, flying squirrel, beaver, muskrat, elk, white-tailed deer, roe deer, willow ptarmigan, blackgame, capercaillie, hazel grouse, partridge, pheasant, woodcock, pigeons, mallard, teal, goldeneye, voles and mice.

b) Information collected from all hunters at the time they buy the yearly hunting licence, about the number of all small game (gallinaceous birds by species, waterfowl collectively, hares collectively, furbearers by species) caught during the previous hunting season.

c) Statistics about paid bounties (bear, wolf, fox, wolverine, lynx).

d) Statistics about killed elk.

e) Statistics about furbearers labelled as being shot within the legal season (squirrel, weasel, muskrat).

f) Yearly censuses on waterfowl control stations (by the Game Research Institute). Species involved: waterfowl, shorebirds, gulls, terns and predators, all by species.

2. Is the information expressed in numbers or as variations about a mean value (above mean, below mean etc.)?

Both as relative abundance in reference to "average" conditions and as changes from the previous year (refers to method 1 a).

3. Does the estimate include the size of the stock of game as well as the bag?

The size of the stock by methods 1 a and 1 f; the approximate bag by methods 1 b-1 e.

4. Which game species are included in the estimate?

Cf. point 1.

5. The size of the yearly bag of these species (the grand total or according to species)?

Cf. point 1 b-e.

6. Does the estimate cover the whole country, or is it based on smaller areas? In the latter case: what is the size of the area?

The individual estimations referred to in 1 a cover areas of 100-300 km<sup>2</sup>. The generalizations cover the entire country and are usually collected separately for the 9 administrative provinces.

7. The number of sportsmen supplying data for the estimate?

About 650 on mainland, and about 100 in coastal areas.



8. Over which period of years have the estimates been made?

- 1a) 1945; comparable data collected by the Hunters' League since 1928;  
1b) 1933; 1c) since about 100 years, not quite complete records; 1d) 1941;  
1e) squirrel 1940, weasel 1946, muskrat 1947; 1f) 1948.

9. Which authorities organize the collecting of data, the statistical analysis and the further utilization of the data?

Collecting: 1a, 1b and 1f) Game Research Institute; 1c) Statistical Central Bureau; 1d and 1e) Ministry of Agriculture. Further analysis and utilization of all data by the Game Research Institute.

10. For which purposes is the information used (preservation, game legislation, scientific research etc.)?

1a) Game legislation (yearly seasons); all data used also for research, preservation purposes, public statistics etc.

11. Has the game research of your country connection with, and possibly, influence upon the preparation and utilization of the game census?

Yes. Cf. above.

12. Which connections, if any, exist between the individual countries as regards mutual exchange of information, for instance through organizations such as "The International Wildfowl Research Bureau" or others?

The internordic agreement (1952) of exchanging information about game populations.

## FRANCE

### METHODS FOR ESTIMATING THE YEAR-TO-YEAR VARIATIONS IN SIZE OF THE GAME POPULATIONS AND/OR BAGS, AND THE UTILIZATION OF THIS INFORMATION

*Guy Pringalle*

1. Which methods are used for obtaining the information?

- ou bien, questionnaires adressés aux 90 fédérations départementales de Chasseurs qui procèdent elles-mêmes par le truchement de leurs services de garderie et de repeuplement à la recherche des renseignements.

- ou bien, et souvent en sus: renseignements fournis par des observateurs spéciaux opérant dans certains secteurs-tests (notamment pour le gibier d'eau), et par le Service des Eaux et Forêts en ce qui concerne, en particulier, le grand gibier des forêts domaniales et des réserves.

2. Is the information expressed in numbers or as variations about a mean value (above mean, below mean etc.)?

Pour le gibier sédentaire l'information donnée est fournie en nombre (grand gibier des réserves notamment) ou bien représente l'évaluation de la densité moyenne à l'unité de surface ou bien est l'indication des tableaux de chasse annuels obtenus sur les memes terrains (Cette dernière méthode est utilisée en particulier depuis 1952 pour l'étude de l'évolution des populations de lapins de garenne atteintes par la myxomatose).

3. Does the estimate include the size of the stock of game as well as the bag?  
Voir ci-dessus.

4. Which game species are included in the estimate?

Essentiellement perdrix – lièvre – chevreuil – cerf – chamois – isard – bouquetin – mouflon – principaux gibier d'eau, et le lapin pour l'étude spéciale citée plus haut.

5. The size of the yearly bag of these species (the grand total or according to species)?

En raison de la diversité des régions naturelles existant en France, il n'est pas établi de statistiques d'ensemble.

6. Does the estimate cover the whole country, or is it based on smaller areas? In the latter case: what is the size of the area?

L'estimation est en général déduite d'observations faites par régions naturelles à micro-climat bien défini, par département ou sur de petites aires dont le nombre et l'importance varient trop suivant le renseignement recherché et l'espèce de gibier pour qu'il puisse être réondu ici à la question.

7. The number of sportsmen supplying data for the estimate?

Lorsque l'enquête est faite par l'intermédiaire des Fédérations départementales de Chasseurs, c'est parmi les propriétaires de chasse privée et les Sociétés communales de Chasse organisés que sont recueillis les chiffres. Leur nombre est éminemment variable.

8. Over which period of years have the estimates been made?

Essentiellement variable selon les régions.

9. Which authorities organize the collecting of data, the statistical analysis and the further utilization of the data?

– Dans le cadre départemental et notamment lorsque l'opération est faite en vue de la réglementation annuelle de la chasse:

– Fédération départementale des Chasseurs,

- Service des Eaux et Forêts.
- A l'échelon Central:
- Conseil Supérieur de la Chasse,
- Direction Générale des Eaux et Forêts, Service de la Chasse,
- Centre de Recherches sur les Migrations des Mammifères et des Oiseaux,  
Bureau d'Etude des Migrations du C.S.C.

10. For which purposes is the information used (preservation, game legislation, scientific research etc.)?

Les informations sont recueillies, selon les cas, en vue de la réglementation de la chasse, de la constitution des réserves ou dans un but de recherche scientifique.

11. Has the game research of your country connection with, and possibly, influence upon the preparation and utilization of the game census?

Oui, le Conseil Supérieur de la Chasse ayant non seulement à organiser les recherches, mais à étudier tous les projets d'amélioration et d'aménagement de la chasse, à coordonner l'activité des Fédérations départementales des Chasseurs et à préparer et mettre au point les textes relatifs à la réglementation de la chasse.

12. Which connections, if any, exist between the individual countries as regards mutual exchange of information, for instance through organizations such as "The International Wildfowl Research Bureau" or others?

On peut citer les échanges réalisés à travers l'Union Internationale pour la Conservation de la Nature et des ses Ressources et la liaison particulière du Bureau d'Etudes des Migrations du C.S.C. avec "The International Wildfowl Research Bureau".

## EAST GERMANY

VERFAHREN BEI DER BEURTEILUNG VON DEN VARIATIONEN DER GRÖSSE DER  
WILDBESTÄNDE UND JAGDAUSBEUTE VON JAHR ZU JAHR UND  
DIE WEITERE AUSNUTZUNG DIESER AUSKUNFTE

Professor, Dr. *H. Gäbler*

Eberswalde

Ich möchte zum Verständnis vorausschicken, daß in der DDR die Wildforschung erst im Wiederaufbau begriffen ist. Über die ersten Maßnahmen kann man aber noch nicht viel berichten. Durch eine Umstellung der gesamten Jagd-

organisation kann ein weiterer Fragenkomplex noch nicht umfassend beantwortet werden.

Als Unterlagen für die Wildforschung dienen uns die Jagdbewirtschaftungsanweisungen der Jagdbehörden der Kreise und Bezirke sowie die Mitteilungen, die uns auf Tagungen und Trophäenschauen zugehen. Außerdem werden die Untersuchungen, die in den Wildforschungsgebieten durchgeführt werden, sowie die Berichte der bei der Wildmarkierung tätigen Jäger ausgewertet.

Das gesamte Material wird von Seiten des Staates von den Jagdbehörden der verschiedenen Verwaltungsebenen gesammelt und ausgewertet. Sowohl die Größe des Wildbestandes als auch die Jagdtausbeute werden erfaßt. Von der "Staatlichen Zentralverwaltung für Statistik" und ihren untergeordneten Dienststellen, die ebenfalls die Jagdstatistik bearbeiten, und den Jagdbehörden werden sämtliche jagdbaren Wildarten, soweit überhaupt exaktes Zahlenmaterial gewonnen werden kann, für die Auswertung vorgesehen. Da aber die sogenannten Schützenanteile und das Fallwild bisher nicht zentral sondern nur von den Kreisen in die Statistik einbezogen wurden, ist es z. Zt. noch nicht möglich, genaue Zahlen über die Jagdtausbeute insgesamt zu erhalten.

Von der Wildstatistik wird das gesamte Areal der DDR erfaßt, zentral wird aber nur, wie schon oben bemerkt, ein Teil der Angaben zusammengefaßt. An der Gewinnung des Zahlenmaterials sind sämtliche Jagdgebietsverantwortliche und Kollektivjäger beteiligt, wobei die wildstatistischen Angaben sich immer auf ein Jahr, den Zeitraum des Volkswirtschaftsplanes, beziehen. Die Sammlung und Auswertung des Materials geschieht sowohl in den Dienststellen der staatlichen Zentralverwaltung für Statistik als auch in den Jagdbehörden der verschiedenen Verwaltungsebenen (Kreis, Bezirk, DDR). Das gewonnene Material wird sowohl der Wildforschung zugänglich gemacht als auch zur Aufstellung der Abschlußpläne etc. verwendet. Durch den Obersten Jagdbeirat, der sowohl die Belange der Wildforschung, der Jagdorganisation und der Naturschutzverwaltung koordiniert, besteht die Möglichkeit der Einflußnahme auf die Bewirtschaftung des Wildbestandes. Zu anderen Ländern bestehen z. Zt., mit Ausnahme von Privatkorrespondenzen, keine Kontakte über den Austausch der gewonnenen Unterlagen.