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Feeding Habits of Pink-footed Geese
(*Anser fabalis brachyrhynchus*)
in Denmark during the Spring Passage in April 1975

by
BOGUSLAW FRUZIŃSKI

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under forårstrækket april 1975

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Continued cover page 3

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CONTENTS

Introduction	3
Investigation areas	3
1. Fiilsø area	3
2. Tipperne-Værnengene	4
3. Nissum Fjord	4
4. Harbør Tange	4
Feeding habits	5
Feeding grounds	5
Feeding activity	5
Cultivated areas	6
Grasslands	7
Analysis of droppings	7
Discussion	9
Dansk resumé	10
Резюме на русском языке	11
References	11

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Introduction

This paper is part of an investigation carried out over several years by the Game Biology Station, Kalø, with reference to the migration and feeding habits of the Pink-footed Goose in Denmark. The migration route from Spitzbergen of this population of the species is along the western coast of Jutland, and is very narrow (FOG 1965, 1971). Considerable numbers of geese stop during their migration and stay at some places for a relatively long period of time. The spring passage coincides with the sowing of spring crops such as barley and oats, and the large numbers of geese which feed regularly on the newly-sown areas cause some damage to them. The Game Biology Station is especially interested in evaluating possibilities of reducing this damage, and therefore investigations into the feeding habits of the Pink-footed Goose were begun.

The author is much obliged to the Game Biology Station for making it pos-

sible to carry out all the observations, and for all the facilities given to him during his short visit to Denmark. A short stay of 2 months was arranged by the Danish Ministry of Education in connection with exchange of scientific scholarship-holders between Denmark and Poland. The main purpose of the stay was to study the investigatory problems and methods of research carried out by the Game Biology Station. In particular the author thanks Mrs. METTE FOG, both for introducing him to the subject matter and also for direct help. Thanks are also due to Mr. P. UHD JEPSEN for his help during field observations, and to Mr. JØRGEN FOG for help in laboratory work.

Field observations were carried out from April 1st – 16th, 1975. They were done mainly from vehicle using binoculars or telescopes. Flocks of the geese were observed throughout the day from dawn till dusk with only very short pauses for meals.

Investigation Areas

Field observations on the migration and feeding habits of Pink-footed Geese were performed at the geese haunts described below.

1. Fiilsø area

The observations were carried out from April 1st – 8th on about 2,000 ha of cultivated land. In the period April 2nd – 6th about 8,000 Pink-footed Geese were continuously observed at the feeding grounds. These birds certainly comprised the peak of the spring passage in this area, and subsequently (April 7–8)

smaller numbers were seen at both the feeding and roosting places. The maximum number of geese passing through was estimated at about 4,500 – 5,000. Some of the geese had probably moved north after this count (large flocks of about 6,000 having appeared at the Vest-Stadil Fjord, where only a few hundred had previously been observed). The only other species of goose to be observed at Fiilsø was the Barnacle Goose (*Branta leucopsis*) of which 8 individuals fed regularly with the Pinkfeet on the newly sown areas.

The main night resting ground for the geese was Fiilsø lake (165 ha) where in previous years geese have only roosted more irregularly (FOG 1971). Moreover some of the geese still went to the waters of Ringkøbing Fjord in the evening although they were not feeding on the Tipperne-Værnengene area during day-time.

The main feeding habitats for Pink-footed geese were newly-sown spring crops and, to a much lesser extent, pasture lands which were used mainly as resting places during day-time, usually midday.

2. Tipperne-Værnengene

During the period of observation (April 1st – 8th) no Pink-footed Geese were found feeding in this area and only small flocks of Grey-lag Geese (*Anser anser*) were seen.

3. Nissum Fjord

The field observations here were carried out in the period April 9th – 16th and

the total number of geese present estimated at 2,500.

Because of the very narrow isthmus between the North Sea and the fjord and the considerable disturbance here by man and vehicles, the geese often fed outside the area during day-time.

In the Nissum Fjord area the Pink-footed Geese fed throughout the day on grassland (mainly pasture land) but also to a lesser extent (25% presence) on cultivated meadows. There were no large areas of cereals. Numbers of geese were highest in the morning and evening and they roosted in the shallow waters of the Nissum Fjord.

At the same time large flocks of Brent Geese (*Branta bernicla*) were observed along the coast. The total number of these was estimated at about 3,000, most of which belonged to the light-bellied subspecies (*Branta bernicla hrota*). Some Brent Geese were observed feeding together with Pinkfeet, but they were roosting separately. Only a few individuals of Barnacle and Grey-lag Goose were seen at this time.

4. Harboør Tange

Field observations were performed during April 10th – 16th at a location south of the Thyborøn Kanal (on the western coast of Nissum Bredning). About 2,000 Pink-footed Geese were observed regularly, usually in the late afternoon and evening. (On Sunday 13th there were only 8 individuals observed at noon).

Amongst other species the Brent Goose (ca. 1,500) was the most common while Grey-lag Geese were only seen occasionally. Pinkfeet were feeding and resting by day-time on the salt marshes (which consisted of very wet coastal grassland, used for hay).

Locality and date of observation	No. geese and time of day			
Fiilsø				
4 April	5300			
5 April	4500			
6 April	5600			
7 April	4000			
8 April	3500			
	} evening			
Nissum Fjord	6-8	10-12	2-3	5-7
	a.m.	a.m.	p.m.	p.m.
11 April	920	436	750	2400
12 April	1100	525	700	2500
13 April	1246	485	875	2500
14 April	1400	1030	1800	2500

Table 1. The number of Pink-footed Geese counted at Fiilsø and Nissum Fjord in April 1975.

Feeding habits

FEEDING GROUNDS

Some differences concerning the feeding grounds of the geese haunts described above were distinctly recognizable.

1. At the Fiilsø area, the main concentrations of geese fed during day-time on newly-sown spring cereals. They seldomly occupied the grassland, but when they did, they were comparatively often observed on the rye-grass (*Lolium perenne*). About 5 ha uniformly covered with this grass were heavily occupied by the geese. The grass height averaged 10 cm and there were also occasional small puddles of water.

During the feeding period the geese were very sensitive to disturbance, e.g. by farmers and vehicles. The "tolerance distance" was generally about 300 m, and only exceptionally 200 (during windy and rainy days). The geese usually fed and rested in the middle of the fields, far from roads, where they might feel most secure. Often disturbed (particularly at midday), they moved to the edges of the area into

the grassland where no farm work at that time was being done.

2. At Nissum Fjord the feeding grounds of the geese were quite different. The Pinkfeet grazed mainly on pasture land, where the vegetation was quite varied. About 90% of the surface was covered by very low vegetation (average height 3–4 cm) heavily grazed by cattle. The higher tufted grass (on an average 10–12 cm) was less common and of varying lengths. The dominant grasses were *Lolium perenne* and probably meadow-grasses (*Poa pratensis* and *Poa annua*). There were only a few cultivated meadows, all covered with a uniform vegetation of grasses (mainly *Lolium perenne*). The height of the grass averaged 10–12 cm.

3. At Harboør Tange the feeding grounds were mostly saltmarshes (wet, coastal hay-cutting areas) covered by a uniform vegetation of grasses (on an average 8–10 cm in height).

FEEDING ACTIVITY

Geese, like other birds, show a characteristic pattern of daily activity, and the daily rhythm of feeding is one aspect of this total activity. The study of the feeding activity of animals under natural conditions is comparatively easier for those species of regular habits than it is for those which gather into large, widely distributed groups. Changes in the daily feeding rhythm are especially evident when the feeding and resting places are not coincident, as for example with geese (even though they are the same during day-time). The total activity of large

flocks is composed of the activity of many individuals. The evidence described below is a result of observations on many flocks of geese feeding during concurrent days. There may be some inaccuracies in the observations but they should give a fairly realistic picture of the feeding activity of the Pink-footed Goose at some haunts in Denmark during the spring passage in April 1975.

Fig. 1 shows the sequence of daily feeding activity of geese on cultivated land and grasslands.

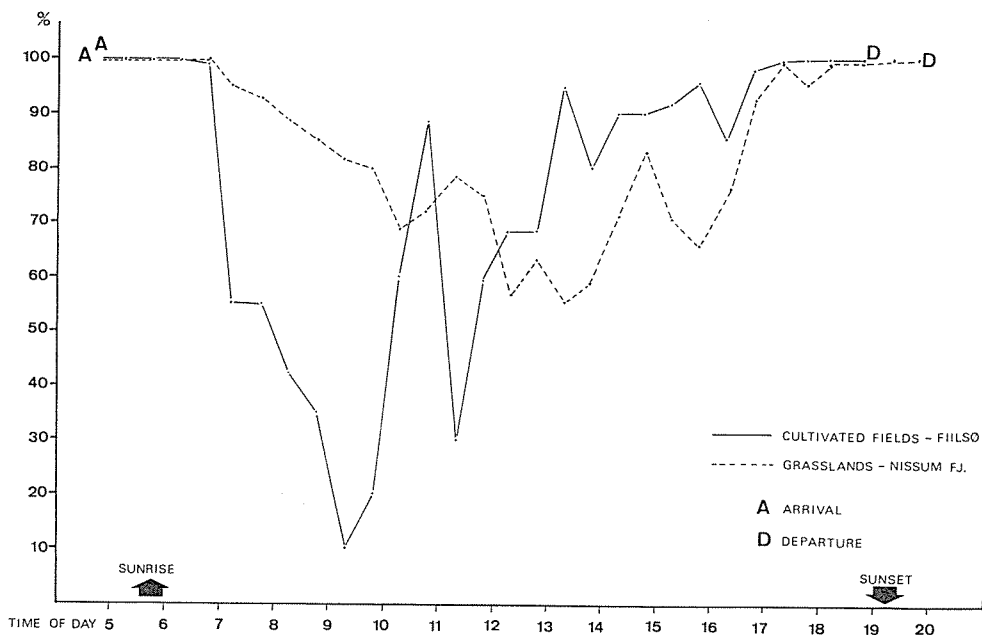


Fig. 1. Feeding activity of Pink-footed Geese (*Anser fabalis brachyrhynchus*) in two areas in W. Jutland during 2-16 April 1975, expressed as the percentage of feeding geese of total number of geese in flocks (averages).

Cultivated areas

On the cultivated areas (mainly consisting of newly-sown barley) two periods of less activity were distinguished. The first followed a two-hour early morning period of intensive activity. The decrease in activity lasted about 3-3½ hours and the minimum feeding activity was noticed between 8.30 and 9.30 a.m. (Fig. 1) when the majority of the geese were resting and some sleeping. Geese were not seen moving to other habitats during this time but resting instead on the feeding grounds at quite a distance from the roads. The decrease came gradually and was most easily noticed in the large flocks. Usually the birds in the middle of the flocks were first to rest, while those still feeding moved to the edges.

The small flocks fed comparatively more actively.

The midday decrease in feeding activity was short (about 1-1½ hours), but very characteristic. At this time the flocks of geese moved on to the grasslands, especially where water could be found, possibly for drinking. A small number of geese flew to the waters of Fiilsø Lake. This was not noticed during the low feeding activity of the morning. The increase in feeding activity was observed from 1 p.m. until evening, the small decrease in activity during the afternoon perhaps being the result of individual differences.

The existence of a daily feeding rhythm has been described on the basis of the percentage of birds involved in feeding in the flocks. In order to obtain the full

character of the daily feeding activity it is also necessary to take other factors into consideration, such as the feeding intensity (very active, moderate, or less active). However, this is difficult to estimate. The highest intensity of feeding was noticed early in the morning and in the evening, when the geese usually walk in a straight line and while feeding do not lift their heads for long periods. In the morning 63 pecks per minute and in the evening 52/min. were counted, but only 46/min. at midday.

The daily feeding rhythm (Fig. 1) might also result from the local availability of food. Where food is plentiful, the energy requirements of a bird can be satisfied in a shorter time than in places where there is less food.

Grasslands

The pattern of the daily feeding rhythm of geese on grasslands (mostly pasture land) was very similar to that found on

cultivated areas, but all extremes were observed (Fig. 1). The morning decrease in activity (9.30–11.00 a.m.) was not easily discerned and a more marked resting period was noticed during the midday hours (12 a.m. – 1 p.m.) when about 50% of the geese were feeding. This could be because of the poor quality of the food; to satisfy the daily energy requirement almost continuous feeding is required. The small decrease in the feeding activity on pasture lands is correlated with that found on cultivated lands except that it occurs some hours later. Also, the intensity of feeding here appears to be higher with 78 pecks per minute in early morning, 65/min. at midday and 72/min. in the evening. On an average the feeding period on grasslands was about 1 hour longer than on cultivated areas, and the geese fed until 40–50 min. after sunset. The roosting flights took place in darkness, but the sleeping and feeding places were very close to each other.

ANALYSIS OF DROPPINGS

The usual method of determining the food eaten by waterfowl is to examine digestive tract contents. However, this involves killing the birds, and in Denmark it is not permitted to shoot geese during the spring (just before the breeding season), (the open season for geese being from August 1 to December 31). Thus in this investigation the method of dropping analysis has been used. The method of estimating the feeding patterns of geese has previously been described by RANWELL & DOWNING (1959).

The droppings were collected throughout the first half of April from the different feeding and resting grounds of the geese. The intention was to estimate the

main components of the diet of whole flocks of geese, so no separate droppings from individuals were collected (and under natural conditions it is virtually impossible to do so). From each place about 1–1.5 kg of fresh matter droppings was taken. Since some differences in colour were clearly visible, all the droppings from one place were taken together (in order to eliminate the possibility of subconscious choice of some samples).

The composition of the different kinds of food in the droppings was estimated as a percentage of the weight of dry matter and the results are shown in table 2.

Sample No.	Character of land	Percentage of weight of dry matter in droppings				
		Grasses	Barley	Grains		Grain husks
				Oat	Total grains	
<i>Fiilsø</i>						
A1	Sown	16.35	11.87	1.43	13.30	70.35
A2	Sown	19.12	17.35	1.48	18.81	62.07
A3	Sown	45.96	10.69	1.05	11.74	42.30
A4	Close to meadow	66.47	8.39	0.89	9.28	24.25
A5	Cultivated	78.36	3.82	0.24	4.06	17.58
A6	Meadow stubble	91.73	—	—	—	8.27
<i>Nissum Fjord</i>						
B1	Pasture land	100.0	—	—	—	—
B2	Pasture land	100.0	—	—	—	—
B3	Pasture land	100.0	—	—	—	—
B4	Cultivated meadow	100.0	—	—	—	—

Table 2. The contents of droppings from Pink-footed geese in Denmark, 1975.

The dropping contents were separated into three groups:

- vegetative parts of grasses (rather uniform dark or light green masses),
- grains (seeds) of barley and oats,
- grain husks (seed-coats).

RANWELL & DOWNING (1959) made rather more detailed analyses of plant remains in droppings of the Brent Goose, but the differences between morphological structure and cell structure are more distinct in aquatic plants. In the case of grasses, reliable estimation is only possible during the flowering season. In this investigation, however, the main aim was to estimate which kind of food prevailed in the diet of the geese according to various habitat factors.

The differences in colour of the droppings were distinctly visible. Droppings with a prevalence of grain husks were yellowish-grey, rather dry and compact in consistency, and very often containing grains or pieces of grains. The results in Table 2 also show the difference in drop-

ping contents, according to the place of collection.

From *Fiilsø* grain husks were found in all samples. A considerably large percentage of husks were found in droppings from the large newly-sown areas where the geese were not only feeding but also resting during the day-time. These groups of droppings also contained comparatively high amounts of grains. The frequency of occurrence of both groups suggests that the geese were feeding very readily on the new sowings of spring crops (grains are usually easily digested) and their presence in droppings proves that they were eaten in large amounts. Moreover, this kind of food has a relatively high nutritive and calorific value. There is no evidence on the food of geese, but the calorific value of barley for mallards has been estimated by SUGDEN (1971) at 3,173 kcal/gram dry matter.

It is impossible to estimate the number of grains eaten by geese on the basis of the amount of grain husks, nor are the

daily nutritional requirements per individual under natural conditions known. Some evidence is, however, given by McFARLAND & GEORGE (1966), with regard to captured birds. For 12 live trapped geese the average daily consumption per goose was approx. 182 grams. It appears that under natural conditions the daily requirement may be even higher (if movement and flight are included). According to FOG (1974) Pink-footed Geese were fed about 300 g of barley per day to prevent crop damage at Vest-Stadil Fjord, Denmark 1973. On the basis of the data mentioned above some very cautious and theoretical conclusions can be

drawn to estimate the daily consumption of grain on the newly-sown areas.

The average number of geese feeding on the sowings was about 5,000 (varying from 4,500 – 8,000). The contents of all the droppings taken from the Fiilsø area averaged 47% grains and grain husks (Table 2). According to the above, the daily consumption of crop-grains (mainly barley) may be estimated at about 425 kg ($\frac{182 \times 5000 \times 47}{100}$). It is a relatively high amount and it should also be remembered that the calculation refers to the grain, not to the crop.

Discussion

Further investigations are needed. A better quantitative result would certainly be obtained by examination of stomach contents, and in addition, field observations would throw some light on the real food-requirements of the Pink-footed Goose during the spring migration. The visual observations on the feeding geese were carried out almost continuously. All feeding places were visited by the author, when the geese had departed to their sleeping grounds. In areas where the main concentrations of geese had been feeding, almost no grains remained on the ground.

The percentage of oats eaten according to dropping analysis varied between 6.5% and 12%, compared with the average for barley of 9.5%. At Fiilsø, oats made up 17% of the total sown area. The amount of oats eaten by the geese therefore probably depends on the amount sown, and also on food preference.

The observations by McFARLAND & GEORGE (1966) suggest that geese prefer

water grasses to barley, but for their food-preference trials they used "grassland" species of geese such as the White-fronted Goose (*Anser albifrons*), Lesser Snow Goose (*Anser hyperboreus*) and Western Canada Goose (*Branta canadensis moffiti*). The barley was most readily taken by the Canada Goose, whose feeding habits might be more similar to species of "field" geese, such as the Pink-footed Goose.

The considerable differences in the occurrence of grains and husks in the droppings taken from separate investigatory areas were partly due to vegetation differences in these areas. The percentage of this kind of food was highest in droppings collected from the large extensive sown areas, where the geese felt safe during the day-time. Only geese which were often disturbed moved on to the grasslands situated on the edges of the large cultivated fields; these grasslands were relatively often visited. Only in one case were geese observed feeding on

stubble, but there the surface was covered by a richly-developed vegetation of grass.

From the Nissum Fjord area, the droppings consisted only of grasses as no large areas of cereals were present there. The geese probably preferred to use the extensive open grasslands rather than the smaller sown areas located close to farm buildings.

The standing crop of grass vegetation declined by about one half in the period November to March whether grazing had occurred or not (based on the evidence of VERVELDE 1970, who examined grasslands

in the Netherlands affected by the grazing pressure of rabbits). Similar effects from the grazing of winter-cereals have been observed by the author in the western part of Poland. Thus it seems likely that geese grazing during the early spring do no harm to the established grasslands.

On the basis of the evidence given above it is concluded that the feeding habits of Pink-footed Geese depend upon:

1. the lokal habitat conditions
2. the crop distribution on cultivated land
3. the degree of disturbance.

Dansk resumé

Fødevaner hos den kortnæbbede gås (*Anser fabalis brachyrhynchus*) i Danmark under forårstrækket april 1975

Denne rapport udgør en del af en flerårig undersøgelse foretaget af Vildtbiologisk Station over træk- og fødevaner hos den kortnæbbede gås i Danmark.

Feltobservationer over træk- og fødevaner hos den kortnæbbede gås blev gennemført i første halvdel af april 1975. Iagttagelserne blev hovedsagelig foretaget fra bil med kikkert eller teleskop. Gåseflokkene var under observation hele dagen igennem fra morgen til aften kun afbrudt af korte pauser. Med henblik på senere analyse, blev der samlet ekskrementer fra de vigtigste fouragerings- og hvilesteder.

Denne rapport indeholder oplysninger om disse områder samt en beskrivelse af fourageringsaktiviteten, der ikke blot er afhængig af tidspunktet på dagen, men også i høj grad af foderpladsernes beliggenhed og karakter.

På de opdyrkede områder (hovedsagelig nysået byg) var der to perioder med mindre aktivitet. Mønsteret på gæssenes daglige foderytme på græs (for det meste græsgange) lignede meget det, man kunne iagttage på dyrkede områder, blot var alle yderpunkter mindre udtalte.

Resultaterne viser forskelle i ekskrementindholdet afhængig af indsamlingsstedet. Fra Fiilsø var der avner i alle prøverne. Indholdet af avner i ekskrementer fra de store dyrkede områder, hvor gæssene ikke blot fouragerede, men også hvilede i dagtimerne, var særlig høj.

Gåseflokkenes daglige forbrug af korn (hovedsagelig byg) skønnes at være ca. 425 kg. Dette er en relativ stor mængde, og det skal bemærkes, at der er tale om sædekornet.

Fra Nissum Fjord området bestod ekskrementerne udelukkende af græs, da der ikke var områder med korn i nærheden. Gæssene foretrak åbenbart at være på de udstrakte græsarealer i stedet for på de små tilsåede marker tæt ved gårdene.

Det konkluderes, at fødevanerne hos den kortnæbbede gås afhænger af: biotopen, afgrødernes fordeling i de dyrkede områder og graden af forstyrrelse, som gæssene udsættes for.

Резюме на русском языке

Кормовые обычаи гуменника (*Anser fabalis brachyrhynchus*) в Дании во время весеннего перелета в месяце апреле 1975 года.

Настоящая работа является частью исследований, проведенных за последние годы Станцией Исследования Биологии Дичи в Калё (Ютландия) над кормовыми обычаями гуменника в Дании во время миграции. Исследования касались весеннего перелёта и продолжались с 2-го по 16-го апреля 1975 года. Стаи гуменников наблюдались из автомобиля через полевой бинокль и люнет в период всего дня обеспечивающего видимость, с короткими перерывами во время приема пищи. В главных местах концентрации гуменника были собраны также их экскременты, которые позже подвергались тщательному анализу.

Работа содержит ряд установлений относительно основных мест где гуменники находят корм и отдыхают в течение дня. Следует также учесть данные относительно активности находки корма, зависимой не только от времени дня, но также и от характера места где находят корм.

В местностях пашни, преимущественно свежих посевов ячменя и овса, замечены

только небольшие периоды меньшей активности в поисках корма. Более значительные различия появились в луговых и пастбищных местностях (иллюстрация 1).

На основании анализа экскрементов, т. е. определения их состава и сухой массы отдельных компонентов констатировано между прочим:

В местностях возделываемых лугов и пастбищ гуменники кормились исключительно злаками. В районах пашни удел зеленой массы трав в корме гуменников резко уменьшился и был по большей мере зависим от местоположения лугов относительно основных мест, где они кормятся, а также от степени беспокойства, вызываемого присутствием людей и работающими в поле машинами (таб. 2).

Вычислено, что дневное потребление зерна (главным образом ячменя) наблюдаемой стаей гуменников составляло около 425 кг, что принимая во внимание период посевов может причинять существенные хозяйственные убытки.

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