GOOSE PRODUCTION IN POLAND AND EASTERN EUROPE

by

Andrzej Rosinski

Agricultural University of Poznan
Department of Poultry Science
60-637 Poznan, Poland

and

Research Institute of Animal Production
Koluda Wielka Experimental Station
88-160 Janikowo, Poland
INTRODUCTION

Although goose production is particularly popular in the Eastern European countries, it does not comprise more than 4-7 percent of the total production of live poultry. The largest producers of geese in Eastern Europe are Hungary, Poland and Romania. Geese are also produced on a commercial scale in the Czech and Slovakian Republics. Depending on the country and the production system, geese are produced for meat, fine feathers and down, as well as for fatty livers (Foie Gras).

Geese are produced primarily on commercial specialised farms that deliver the birds at slaughter age to poultry processing plants. For large producers, the relationships between the goose production farms and the slaughterhouses are based on long-term contracts. Geese are also kept on a small scale as backyard farm flocks for the farmers’ own needs and for sale, mainly as live birds at nearby markets.

These smaller scale farm flocks deliver good quality meat, fat, feathers and down at a relatively low cost. They demonstrate that geese are highly adaptable to various environmental conditions, resistant to climatic changes and efficient in their feed utilisation since they can utilise green feeds from both pasture and non-cultivated land. Depending on the size of the production unit and various other factors, geese can be produced under both a relatively semi-intensive management system or an extensive management system.

Fatty liver production in Hungary is approximately 920 tons per year while in Bulgaria it is about 65 tons per year and recently Lithuania has produced about eight tons per year. In the 1990s, approximately 30 tons of fatty liver was also produced in Poland using Landes geese imported from France for this purpose. About 2000 parent flock geese were maintained to produce 50-60 thousand goslings annually for this purpose. Since the beginning of 1999, however, force feeding (cramming) of geese has been prohibited by law in Poland.

Poland and Hungary are the largest exporters of goose meat from Eastern Europe. Goose meat from both countries is exported primarily to western European countries, mainly to Germany. These exports meet nearly 100 percent of the demand for goose meat in Germany. Export sales to Germany are of a seasonal nature and take place primarily from October to the beginning of December. The highest demand for goose meat in Germany is during the Christmas and New Year holiday periods.

For decades, goose production for export has been considered one of the main activities of the Polish agriculture. Between 5.5 and 6.0 million day-old goslings are hatched each year for this purpose and the country’s live goose production amounts to 27-28 thousand tons per year.

During the years 1995-1998 a substantial increase (47 percent) in goose meat production was observed. During this same period exports of goose meat (mainly of whole carcasses, breasts and legs) increased by 44 percent, from 11.5 thousand to 16.6 thousand tons. In 1998 the ratio, based on weight, of whole carcasses to breast and legs being exported from Poland was 60:40.

The economic importance of Polish goose meat export is confirmed by the fact that it accounts for 50-52 percent of the total poultry products exported from Poland although, at the present time, geese production is only 5-6 percent of the total amount of live poultry produced in Poland.

Goose production has a long tradition in Poland and was developed in the nineteenth century when, at the Warsaw Livestock Exchange, approximately three million geese were sold annually to Germany. At that time Russia was the largest producer of geese in Europe. Because the birds had to walk to get to market, before the journey they were herded through melted pitch and then through fine sand. In this way a fine layer of pitch and sand protected their feet during the long journey.

Both the intensification of farming and the World Wars reduced the goose population in Poland and in other Eastern European countries. The number of the goose varieties and breeds has also diminished.
**BREEDS**

Today the main goose breed being grown on a commercial scale in Poland is the White Italian goose which was imported from Denmark in 1962. The birds adapted well to Polish management conditions and with their good egg production, meat yield and carcass quality, they soon superseded the popular Pomeranian and other indigenous breeds of geese.

Among the native breeds found in southern Poland are the Lubelska, Kielecka, Podkarpacka, Garbonosa, Bilgorajska and Zatorska; whereas in northern Poland the Kartuzka, Rypinska, Suwalska and Pomorska are found. Even though at one time they were popular throughout Poland, these breeds are now only kept in small backyard flocks as they are of marginal importance to commercial goose meat production. However, for the purposes of genetic conservation and cultural reasons they are also kept at three research stations in Poland as it is recognised that they could, in the future, be a source of certain genes that may have been removed from existing commercial populations due to intensive genetic selection. The performance traits of the regional goose breeds demonstrate great variability although their performance level is, in general, lower than the White Italian goose. They lay from 15-41 eggs per layer per year, with an average egg production intensity from 12-31 percent, an egg weight of 145-156 g and a percent fertility of 61-72 percent. Percent hatch of fertile eggs has been found to be between 32-53 percent. Body weight at 12 weeks of age varies from 4.2-4.9 kg for males and from 3.6-4.3 kg for females. The indigenous breeds demonstrate numerous valuable characteristics such as resistance to diseases, good egg shell quality, docility, adaptability to poor environmental conditions and an ability to utilise low quality feeds. These indigenous varieties and breeds are also seen by the inhabitants of certain regions of Poland as important elements of culture and tradition.

At the present time, the semi-intensive system of goose management predominates in Poland. Only in the small backyard flocks, primarily for the needs of the farm owners, are geese being kept under predominantly extensive production systems.

**GENETICS AND BREEDING**

Over the past 35 years the Polish selection and breeding programme has developed two valuable strains of White Italian geese. Management, nutrition and disease control programmes have been designed for both the parent and commercial stocks and incubation procedures have also been improved. Development of goose production in Poland has been stimulated by the introduction into commercial practice of research findings and technological developments. Research programmes on goose production are being conducted by the Research Institute of Animal Production under the Ministry of Agriculture and Food, the Institute of Animal Physiology and Nutrition and five agricultural universities.

The genetic improvement of the goose in Poland is being conducted by the Research Institute of Animal Production on a pedigree farm at Koluda Wielka called the Koluda Wielka Experimental Station. Two pedigree strains of the White Koluda goose, the W33, a male line, and the W11, a female line, are being selected. In the male line (Figure 1), among the primary selection objectives are increased body weight and meat yield, combined with a lower fat content in the carcass. In the female line, selection criteria relate to higher reproduction performance. Egg production per female for the W11 strain ranges from 65-73 eggs, percent fertility from 85-90 percent and percent hatch of fertile eggs from 81-84 percent. Feed consumption for the W11 strain is 990 g per egg, lower than that for the W33 strain which is 1130g per egg. Body weight for birds of the W33 strain (6 800 g) is 400-500 g higher than that of the birds of the W11 strain (6 300 g) and their breast muscle weight at 17 weeks of age is also greater (750 g and 650 g respectively), but their fertility and hatch percent is up to ten percent lower. The yield of breast and leg muscles is similar in both strains and ranges from 35.1-36.2 percent.
FIGURE 1. The strong body conformation of a goose of the W33 line (Source: Rosinski, 1999)

REPRODUCTION

The majority of commercial hatching eggs are produced from a crossing programme using males of the W33 strain as the male parent and females of the W11 strain as the female parent. The pure strain mating of a W11 male with a W11 female is only used to a limited extent to produce commercial hatching eggs (goslings) i.e. 16-18 percent of reproduction flocks in Poland.

In 1998 the parent stock population of breeder geese in Poland was about 230 000 layers. The average size of the parent stock farms ranged from 450-500 layers; however, there are also some parent stock farms that have from 3-4 thousand layers each. The smallest parent stock farms have from 100-150 layers although these are rare. The breeding geese in parent stock flocks are kept for four years i.e. four reproductive seasons.

The lay season is from the end of January or beginning of February until June and lasting on average about 20 weeks. Its duration depends on the number of hours of light the birds receive per day and whether the lighting programme is natural daylight or an artificial lighting programme that can be applied in windowless poultry houses. Only natural mating is used and one gander is required for every 4-5 geese. After four reproductive seasons the geese are sent to a slaughterhouse and a new parent flock is established.

In Poland goose hatching eggs are incubated in about 50 commercial hatcheries equipped with walk-in incubators which are either produced in Poland on PAS REFORM (NL) licence, or of foreign manufacture. In a few small hatcheries the old type of incubators (holding 100-150 eggs) are still in use. Goslings are produced by artificial incubation only. Even goslings for backyard flocks are purchased from hatcheries. Before the Second World War natural incubation was popular for Polish backyard flocks and either older female geese or turkeys were used, with each covering 13-15 or 11-13 goose eggs respectively.
Rearing

Goslings to be used as parent stock for the following year need to be hatched between March and the end of May because the birds should start laying eggs in their first season at the age of 8-9 months. The greatest demand for goslings in Poland is in the spring (April to May) since rearing birds is easier at this time when temperatures can reach 20-25°C, lessening the need to heat poultry houses. Also, the goslings can have access to yards and pasture when they are younger and have new grass available for grazing. Up to six weeks of age the goslings are kept in a poultry house with access to a yard.

Either poultry houses specifically designed for this purpose are used or, more frequently, buildings which housed adult parent stock already marketed. Before re-use, the used deep litter must be removed from the poultry house, and the house thoroughly washed and disinfected, and a treatment applied to get rid of rats and other vermin. To reduce heating costs when a poultry house is too large, it can be divided into sections with plastic film curtains. The goslings are housed on deep-litter in lots of between 100-200 birds. Stocking density during the first week of age is 8-10 birds per m² of floor area and the density of birds is then reduced gradually with age and reaches 2-3 birds per m² of floor area by 11 weeks of age.

During the initial rearing period the poultry house can be heated with oil, gas or electric heaters, or with central heating. Air temperature must be maintained at 24-26°C during the goslings’ first week and can gradually be reduced to 18°C by the fourth or fifth week. During the first three weeks when additional heat sources are often needed, electric or gas brooders can be used (infrared lamps are the most popular). One infrared lamp is sufficient to produce heat for 25-30 goslings. Usually three infrared lamps are installed on a single wooden triangle frame hung from the ceiling. Air temperature under the additional heat source is initially 6-10°C higher than the room temperature but, after the first week, can be changed to 4-6°C higher than the room temperature. During the first days, the infrared lamps are hung about 40-50 cm above the litter and are lifted to 60-70 cm or higher as the birds get older. If infrared lamps are used, they are also a light source and provide a 24 hour lighting programme in the poultry house until the goslings are approximately three weeks of age. If normal electric, gas or oil brooders are used, the rearing room should have a lighting programme of 24 hours of light until the goslings are two or three days of age and then 14-16 hours of light per 24 hours. From the fourth week, the goslings are generally under natural daylight. When lighting programmes are changed, it is important that the birds are introduced to darkness gradually since they can react to darkness by crowding and this can lead to suffocation.

The deep litter must be kept dry, in good condition and free from fungi. High moisture content in the litter at a high air temperature can stimulate the growth of fungi, causing Aspergillosis which can kill as many as 80 percent of the goslings. For deep litter, rye, wheat or barley straw cut into 5-8 cm pieces is recommended.

In small rearing houses natural ventilation via an exhaust chimney is used. In large houses, however, mechanical ventilation must be employed. When outside temperatures are about 20°C and until the goslings are three to four days old, ventilation of the rearing house can be achieved by opening the windows.

Various types of feeders and drinkers are used for goslings. Large goose rearing houses have automatic feeding and drinking installations, whereas smaller ones have simple non-automated feeders and drinkers. Their size is in accordance with the age of the birds. Very popular are bell shaped plastic drinkers that are used during the first two weeks of the rearing period (one drinker for 30 goslings). Trough drinkers made of sheet aluminium are also used and are of the following dimensions: 100 x 4 x 6 cm (for birds up to two weeks of age), 100 x 15 x 12 cm (for birds from 2-4 weeks of age) and 100 x 20 x 25 cm (for birds older than four weeks). The number of drinkers and their length is adjusted to provide the following linear drinking space per bird: 2 cm per bird up to two weeks of age; 3-4 cm from 2-4 weeks of age and 5 cm for birds over four weeks of age.

Feeders are also made of sheet aluminium or dry wood and have the following dimensions: 100 x 15 x 7 cm for birds up to two weeks of age; 150 x 30 x 15 cm for birds from 2-4 weeks and 170 x 30 x 25 cm for older birds. The linear feeder space per bird is as follows: 4 cm up to two weeks of age; 8 cm from 3-4 weeks of age; 10-15 cm from 5-7 weeks of age and 20-25 cm for older birds.
Goslings of 7-10 days of age are given access to a yard during mild weather, but only for 20-30 minutes per day. This time is extended gradually as the birds get older. From 0.5 to 2.0 m² of yard area is required per gosling, depending on age. The grass or solid surface yard is located near the rearing house. The yard can be equipped with feeders and drinkers and a shelter is required to protect birds from excessive sunshine if there are no trees.

Up to 5-6 weeks of age or until the oil glands of the birds have developed, the goslings are not allowed to graze on wet grass or during a rainfall. From six weeks of age onwards the birds are put on the nearby yard or pasture for the whole daylight period, but come back to the poultry house at night. From 12 weeks of age onwards geese may be on pasture for 24 hours a day.

In such cases the birds are generally maintained on a distant pasture and are kept there in a pen overnight. Goslings in open yards and on pastures are susceptible to attack by predators, including predatory birds like the goshawk; whereas older birds are subject to attack by predators such as foxes and martens.

Goslings to be used in parent flocks are fed intensively until four weeks of age on a complete ration of 19-20 percent crude protein, 2.60-2.75 Mcal metabolizable energy per kg and 4-5 percent crude fibre. Birds are fed ad libitum up to three weeks of age.

From the fourth week they are fed 210 g per bird per day. The complete ration contains ground wheat, barley, triticale or maize and a protein supplement such as soybean meal or canola (rapeseed) meal. Other ingredients are also used, e.g. dried grass, feed grade yeast and sometimes the seeds of lupins, peas, faba beans or field peas. The complete ration is supplemented by adding a mineral-vitamin premix. These complete rations are manufactured by commercial feed mills and sold to goose producers. Currently the feeds provided to the goslings during this initial rearing period are seldom prepared by the farmers themselves.

From days 3-4 onwards the goslings are introduced to small amounts of green forage on a regular basis and the quantity is increased as they get older. Birds are given finely-cut, young fresh green forages like nettles, dandelions or grass. Early hatched goslings, i.e. in March or April, are given carrot puree if no green forage is available. From the fourth week of age, when the amount of complete ration is reduced, the green forage is given ad libitum. Up to the end of the fourth week of age the total consumption of the complete ration per bird is 3.7-4.0 kg and of green forage about 3.5 kg. At this time the average body weight is about 2.1 kg.
From the fifth week of age onwards the amount of complete ration is reduced to 200-230 g per bird per day depending on the quality of the green forage and pasture. The initial nutritive value of the complete ration is: 17-18 percent crude protein, 2.6-2.7 Mcal of metabolizable energy per kg and 5-6 percent crude fibre. From the eighth or ninth week to the twelfth or fourteenth week of age the birds are fed mainly on ground grain (90 percent) with added canola meal as a protein supplement. The nutritive value of this mixture is as follows: 13-13.5 percent crude protein, 2.68-2.75 Mcal of metabolizable energy per kg and 6-7 percent crude fibre. During this period the birds are given green forage ad libitum. Apart from pasture, geese are often given cut grass and consumption of it increases from 600 g per day at six weeks of age to around 1 500 g per day at 12 weeks of age. Consumption of the complete ration over the period from 5-12 weeks of age amounts to 11-13 kg per bird and about 50-60 kg of green forage per bird. Average body weight at 12 weeks is about 4.5 kg for males and 4.0 kg for females.

From 13 weeks of age until autumn, the main feed source for young geese is pasture. About 100-120 birds may be kept on one hectare of pasture. During that time geese are given 100-170 g per bird per day of ground grain (oats, barley and wheat) depending on pasture quality.
The best goose pasture contains a mixture of grasses, leguminous plants and herbs. The following grass species are used for goose pasture:

- grass species resistant to both overgrazing and trampling: *Phleum pratense* L., *Festuca pratensis Huds.* and *Lolium italicum* A.Por.

Fine stemmed palatable legumes account for 10-20 percent of the pasture mix. If there is shortage of natural pasture, geese can be kept in orchards, stubble fields and green wastelands of various types but in such cases they are also given freshly cut forage. In spring the earliest fresh forage is obtained from nettles, winter rape, and rye together with leguminous plants e.g. *Vicia villosa* Roth and then later from winter wheat and spring cereals (oats and barley). In summer, green forage from the second grass cutting is given to the birds. From mid-August, maize, sunflowers, third grass cuttings and sugar beet leaves are good sources of green forage for geese. The birds are often kept on stubble fields after the harvest of cereals and leguminous plants. In October geese are given fodder kale or root crops, e.g. red fodder carrots or sugar beets cut in half. Fresh beet pulp, steam-cooked potatoes or mixed silage are also used.

**Laying period**

In November young ganders and geese destined for the breeder flock are kept indoors and prepared for their first season of reproduction. Usually the breeder flock comprises birds of the same age. Age differences of no more than two weeks are tolerated but the males must be older than the females. In the reproduction flock no changes are required except for the culling for health defects. The birds are kept indoors but have access to a yard during daytime. Only during the very cold winter (December-March) are the birds kept indoors 24 hours a day.

Poultry houses for breeder flocks and the resulting management conditions depend on the scale of production. There are both specialised buildings and those adapted as poultry houses for breeders. There are houses with and without windows, with and without heat, mechanical ventilation or with natural ventilation but all houses have an adjacent poultry yard. A few large farms have poultry houses built in the 1990s which have a controlled microclimate but on the majority of smaller farms the poultry houses have been adapted from barns, covered shelters or old piggeries. Adaptations can be made relatively easily and at a low cost. The walls must be sealed to eliminate draughts, the ceiling must be insulated to keep the heat in, a new floor installed and wall openings to the yard provided. Additional air inlets are also required to ensure proper ventilation, as well as additional windows, if necessary. Unheated buildings are not harmful to birds despite the cold Polish winters although the water supply sometimes freezes. The optimum temperature for a goose-house during the reproductive season in Poland is 5-8°C.
Parent stock geese are kept on deep litter made up of cereal grain straw (mainly rye) either whole or cut. New litter is added daily or every second day and it is all removed after the lay period, prior to cleaning and disinfecting the poultry house. The initial layer of deep-litter is 5-7 cm thick and this is gradually increased up to a thickness of 30-40 cm.

Stocking densities are 1.4 bird per m² of floor area in the house and 0.7 bird per m² in the yard. On the majority of goose farms the yard is adjacent to the goose house and is fenced. Most frequently these are grass or soil yards and rarely covered with concrete or asphalt. Soil yards of frozen ground are waterproof and are sometimes covered with whole or cut straw to which peat has been added. On some farms, yards with a hard surface have a pool that is used by the geese after the winter period but in general, the reproduction flock does not have access to water reservoirs or ponds during the laying period.

FIGURE 6. A reproductive flock on straw litter (Source: Rosinski, 1999)

FIGURE 7. A reproductive flock of geese during their first year of lay in a fenced yard with pool (Source: Rosinski, 1999)
The feeding and drinking equipment in the poultry houses for geese varies from simple wooden or sheet metal feeders and drinkers filled manually to semi-automatic and automatic installations made by established manufacturers. On small farms, the feeders are generally made with dry, smooth wood or sheet aluminium, with a bar on top to prevent wastage. Feeders are usually 150-200 cm long, 30 cm wide and 25 cm deep. The number of feeders is dependent on flock size with each goose given 20-25 cm of linear feeder space. The complete ration is generally fed indoors but the green forage is given outdoors.

Trough drinkers 100 cm long, 20 cm wide and 25 cm deep are also made of sheet aluminium and each goose requires 5 cm of linear drinking space. In the poultry houses there are open nests made of wood that are 50-70 cm in width and depth. One nest is sufficient for 2-3 geese. The nests are situated in one row against a building wall and have neither floor nor back wall. At the front of each nest there is a wooden bar of 10-15 cm in height to prevent the loss of litter from the nest. The sides are 70 cm high.

The more intensive feeding of the geese for reproduction starts in December to prepare them for the laying season. The birds are given the same complete ration that they will receive during the lay period, beginning at 200 g per bird per day and then increased to 250 g per bird per day. At the beginning of January and during reproductive period the geese are fed ad libitum on a complete ration of 14-15 percent crude protein, 2.5-2.6 Mcal of ME per kg and approximately 3 percent calcium. The following feed ingredients are used: a ground cereal grain (wheat, barley and oats) up to 67 percent, ground peas up to 5 percent, ground maize up to 10 percent, either soybean or canola meal up to 16 percent, dried grass up to 10 percent and a mineral-vitamin premix. During feeding ad libitum the consumption of this complete ration is initially increased up to more than 500 g per bird per day and then gradually decreased to around 350 g per bird per day. For the entire lay period the consumption of complete ration is about 60-65 kg per goose on average.

Another method for feeding geese during the reproductive period is to use a combined system using a limited quantity of a complete ration (about 300 g per bird per day) together with a bulky feed (about 200-300 g per bird per day or more). The birds are usually given either red carrots, fodder beets (up to 200 g per bird per day), kale (up to 500 g per bird per day), hay (up to 50 g per day) and steam-cooked potatoes as the bulky food.

On smaller farms the birds are maintained under natural daylight. In such cases the lay season begins in mid February and continues until early June. The highest intensity of lay is observed in March and April. The number of eggs per layer produced over the season under these conditions is not usually more than 40. On many farms various lighting programmes are used but the most popular programmes provide the geese with 10-12 hours of light. The lighting programme starts about 30 days before the beginning of the laying season. At the end of December, when the natural daylight is about nine hours per day, the period of light is extended by using electric lights for 10-15 minutes every second day. In this way the required duration of 10-12 hours of light can be reached and maintained at the same level until the end of reproductive season. During the daylight period the birds are in the poultry house or in the yard. For the standard 12 hour lighting programme, the lighting period is from 7.00 a.m. to 7.00 p.m. For the ten hour lighting programme, it extends from 7.00 a.m. to 5.00 p.m. For the dark period the birds are then kept in the house and the lights are switched on and off automatically according to the lighting programme. The use of artificial lighting programmes, particularly with the reduced hours of light, requires windowless houses with good ventilation. These programmes are also used in poultry houses with windows that have been painted dark or covered.

With 12 hours of light per day, the laying season begins in mid-January and ends in June, with an average laying intensity of 40 percent. The average egg production for this period is 54-57 eggs per female.

With ten hours of light per day, the laying period is 20 days longer than with the programme of 12 hours of light per day and the number of hatching eggs is increased by 15-20 percent, but the average laying intensity, at 38 percent, is slightly lower. Because of the longer laying period, however, the average number of eggs is greater, i.e. 63-68.

To increase laying intensity, at the beginning of the laying season under the programme of ten hours of light per day, a “light stimulus” is applied. This consists of lighting the poultry house for 24 hours for one day
only. This stimulus is applied on about the fifteenth of January and thereafter the hour programme is continued. Ten days after application of the stimulus, the laying performance of the flock is about ten percent and during the next 4-6 days it will increase to 40 percent.

Very good results have been reported during the reproductive period with lighting programmes that provide only eight hours of light per day. With this programme a greater number of eggs can be obtained from each female because the lay period is extended until July and higher fertility can be maintained until the end of reproductive season. Values of up to 80 percent have been reported. However, this lighting programme is seldom utilised by goose breeders.

Hatching eggs are collected 3-5 times a day. The nests must be maintained at a high level of hygiene and their litter replaced frequently. After collection the eggs are disinfected on the farm by UV light or formaldehyde gas and delivered to the hatchery once a week. The price of goose hatching eggs accounts for 40 percent of the price of day-old commercial goslings.

Egg production of White Koluda geese kept under local conditions and in various management situations, is between 44-55 eggs per bird in the winter-spring reproductive season. The percent fertility ranges from 84-92 percent and the percent hatch of eggs set ranges from 66-70 percent.

From the end of the laying period until November, the breeder flock is kept in yards or on pasture where the birds are fed on green forage and other bulky feeds, supplemented with ground cereal grain.

MEAT PRODUCTION

As mentioned, both the White Koluda W31 (from the cross of a W33 male with a W11 female) and the W11 pure strain birds are used as commercial stock for meat production. On completion of the fattening period at 17 weeks of age, the W11 geese have a bodyweight about 0.5kg lower than the W31. The W31 hybrids currently account for 80-85 percent of the total market goose production in Poland while the W11 pure strain birds account for 15-20 percent.

The most popular production system consists of growing the geese until 17 weeks of age (the second cycle of feather maturity) although some flocks are grown until 24 weeks of age (the third cycle of feather maturity). In both cases the production system is semi-intensive and the goslings are fed intensively on a complete ration until four weeks of age. During their first week of age fresh green forage is introduced into their diet. From the fourth or fifth week until 12 weeks of age the goslings are given green forage ad libitum and a complete ration limited to 210-240 g per bird per day. In week 11 the birds are partially plucked and the amount of complete ration is increased by 20-30 g per day. From weeks 13-14 the birds are given 150-170 grams of complete ration per day and green forage ad libitum.

The type and quality of complete ration and green forage is similar to that used for rearing goslings for the reproduction flock. The management system of the birds is also the same, that is, rearing them under a system using both a house and yard up to the sixth week of age and thereafter using either a yard or pasture system. However stocking density may be higher by 1-2 birds per m², e.g. in the first week of age which means 10-12 goslings per m². The fattening period is three weeks prior to slaughter i.e. from 15-17 weeks of age inclusive. During this time the birds are kept indoors or in yards. They are often kept in fenced pens, each holding 250-300 geese. The geese are kept at 0.33-0.50 m² per bird. At week 14 oats is gradually introduced into their diet. No bulky feed is given to the birds during the fattening period and the consumption of oats amounts to 10-11 kg per bird for this period. During the fattening period the birds gain between 1.2-1.4 kg and by the end of the fattening period at 17 weeks of age, their final body weight is between 6.0-6.7 kg.

Total consumption of the complete ration and oats is approximately 28-30 kg per bird and that of green forage between 60-65 kg per bird. Fattening birds in autumn is easier because of their genetic and physiologic
tendency to have a greater appetite during this period as well as a tendency for increased fat accumulation. To prevent the birds from becoming excessively fat, the daily ration of oats is limited to 600-700 g per bird per day. In the summer months from June to August goose fattening is less effective as the high temperatures reduce their appetite. This decreased appetite can, in part, be overcome by adding either red carrots or fresh succulent green forage to the oat ration at the rate of 100 g per bird per day.

When the geese are to be slaughtered at the age of 24 weeks, they are given less complete ration per day (100-150 g per bird per day) for a longer time, i.e. until 21 weeks of age. During this time green forage (either as cut grass or pasture) is the main feed, and the second plucking is performed at 17 weeks of age. The geese are fattened with oats for the three week period from 22-24 weeks of age inclusive. The body weight of these geese is usually 0.4-0.6 kg higher than birds marketed at 17 weeks of age.

The carcass of a goose fattened with oats is called “oat goose”, and is one of the specialities of Polish agriculture. “Oat goose” meat is considered a high quality product on the German market. The high quality is a result of both the genetic traits of the goose and of the feeding system used. At 17 weeks of age, the slaughter yield (carcass without giblets) is about 65-66 percent; the breast muscle yield from the carcass (with neck) is about 18-19 percent and the leg muscle yield is 16-17 percent. The carcass has an optimal subcutaneous fat layer and the peritoneal fat content is 3-5 percent.

On large goose growing farms the number of birds is from 3-4 thousand birds. On the smallest farms around 500 birds are grown and fattened. In all cases the number of birds and their marketing is synchronised with the capacity of the slaughterhouse to which they are taken. Some very large farms grow up to 50-60 thousand “oat geese” annually. The increasing demand for young commercial geese in the 1990s has resulted in the construction of large farms where geese are grown in poultry houses under controlled microclimatic conditions and with automatic feeding and watering equipment.

Apart from growing geese on commercial farms, the traditional system of keeping them in backyard flocks of various sizes ranging from 10-40 birds is still popular. Geese are initially reared in one of the farm buildings or even in the farmer’s house (up to ten goslings) with an infrared lamp or a common light bulb used as a supplemental heat source. Goslings are fed a commercial complete ration for the first two weeks which, from week three, is mixed with ground wheat. From 6-8 weeks of age the birds are given ground cereal grain (wheat, oats or barley). Green fodder is given from the beginning of the rearing period. Geese are kept together with other farm animals and are allowed to range freely where they can graze for grass and weeds. In nearby ponds or other water reservoirs they can find duck weed and other water plants. For feeding geese in backyard farm flocks kitchen waste and by-products including vegetables, fruit (mainly apples and plums) can be used. The geese are also given such things as red beets, steam-cooked potatoes, carrots and cabbage. During the growing period the soft feathers and down are partially plucked and the feathers and down used as pillow and duvet filling. The geese are usually kept until December when they are slaughtered, and the meat and fat used by the family for their own needs.

**FEATHER AND DOWN PRODUCTION**

Soft feathers and down from the breast and abdomen of geese are valuable raw materials and can be sold at a relatively high price. They are obtained by partial manual plucking of live birds. This operation has to be done when the feathers are fully mature and the foot of the calamus is closed and free of blood, and can be easily removed without skin damage. Done properly, the plucking of live birds is not harmful and has no detrimental effect on productivity. On the contrary, it results in a more uniform growth of new feathers and can improve the appearance of the carcass. In Poland plucking of live geese is performed on young and adult birds.

The first period of soft feather and down maturity is between 10-11 weeks of age when 60-70 g of white soft feathers and down can be obtained from one goose, of which about 16 percent is down. The subsequent pluckings are done at 6-7 week intervals, as this is the period required for the soft feathers and down to mature.
Commercially produced birds that are to be fattened are plucked alive either once (if slaughtered at 17 weeks of age), or twice (if slaughtered at 24 weeks of age). Young breeding stock birds are usually plucked alive three times: at 10-11 weeks, 17-18 weeks and at 24-25 weeks. The second and third pluckings each yield between 100-120 g per bird of soft feathers containing 19-22 percent down. Adult geese in the reproduction flock are plucked three times after the reproductive season. The first plucking after the end of the laying period delivers 70-90 g of soft feather with a down content of 15-17 percent. The two successive pluckings yield 110-130 g of feathers with a down content of 28-32 percent. Adult birds sometimes have a fourth plucking which is done in the first ten days of December. This last plucking is the most efficient and up to 150 g of feather and down can be obtained per bird.

Before plucking the birds are bathed and allowed to dry overnight on clean, dry straw to give the feathers and down a better colour. They have their shanks bound with a soft textile tape and are put on their backs on the knee of the person doing the plucking. The bird’s neck is slightly pressed down with the left hand and the lower part of neck, breast and abdomen, as well as the sides of the body, are plucked. The flank feathers are not removed and the back of the body is not plucked. Feather and down are used both for the manufacture of high quality bedding and clothing articles in Poland and exported as raw materials, mainly to Germany, Switzerland and Japan.

**PREVENTION**

In large-scale production of breeding and market geese, great attention is paid to hygiene and disease control. On the farms, the rearing houses are properly prepared prior to the introduction of goslings. The rooms and equipment are cleaned, washed with hot water containing detergents and sanitizers. The rooms and the production equipment are disinfected mainly with formaldehyde gas. The yards are also disinfected. Hard surface yards are disinfected with a 2-3 percent iron or copper sulphate solution or with other disinfectant preparations. Soil yards are disinfected by spreading chlorinated or burnt lime in the quantity of 1-4 kg of lime per m², after which they are rinsed with water and a few days later ploughed to a depth of 15-20 cm. Geese that were kept on pasture are treated for parasites, mainly against Amidostomum anseris prior to introduction into the poultry houses. The reproductive flocks and goslings are vaccinated against Derzsy disease.

**REFERENCES**


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