

EFFECT OF TEMPERATURE AND RELATIVE HUMIDITY ON FEED CONSUMPTION OF THE GEESE AND INFLUENCE OF FAT SUPPLEMENTATION OF THE FEED ON THEIR EGG PRODUCTION

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Introduction

Economy of geese breeding is markedly influenced by the number of eggs produced and their hatchability. It is well known that body mass of the geese decreases during egg production and their fat depot becomes almost entirely depleted. Rate of the loss of fat reserves is accelerated by increase in summer temperature, since it reduces appetite and therefore available energy for production is inadequate. These recognitions threw up the idea, that with increasing temperature and advanced egg production, laying premix should be supplemented with fat powder. By means of fat enrichment of the laying premix, energy deficiency caused by decrease in appetite, may be moderated and thereby temperature load on the birds too.

Methods and materials

Studies on egg production of laying geese and hatchability of the eggs were carried out with Hungarian, Rhine and Landish geese and for fat powder feeding experiment Rhine geese were used. Data on temperature and relative humidity were acquired from the meteorological stations nearest to the geese breeding plants. Feed consumption was studied on the base of the amount of feed refilled daily into the self-feeder. GFV geese laying premixes were fed in the geese breeding plants under study /GFV = Enterprise for Trade in Grain Cereals/. In studies with fat powder, 95% premix, produced by the GFV was supplemented with 5% fat powder for the experimental groups.

Results

Feed consumption of Rhine geese as influenced by temperature and relative humidity

It was shown by the results of the experiments carried out with Rhine geese, that feed consumption of the laying geese increases with increasing egg production. In spite of this fact, laying geese of good performance are unable to take up as much feed as they would be require to meet their nutrient demands for production. This is why body mass of the laying geese decreases during the period of egg production. With increasing temperature Winchester-Kleiber /1983/ and Jack-Resiers /1979/ found 43 and 27% decrease in feed consumption, resp., while they demonstrated 15% decrease in feed utilization. Authors obtained between main daily temperature and feed consumption a correlation of $r=0,3343$ value. Combined effect of main daily temperature and relative humidity decreased feed consumption to a greater extent and a correlation of $r=-0,4537$ was established. It has been stated that feed consumption diminished already in temperature ranges above 16°C showing slight tendency between $16-27^{\circ}\text{C}$, while it decreased sharply above 27°C . Average feed consumption of geese with 1:4 sex ratio at $4-15^{\circ}\text{C}$ temperatures amounted to 283,7 g, while at 17, 20, 25 and 30°C it decreased to 268,9 g /94,78%/, 254,7 g /90,6%/, 226,4 g /79,8%/, 198,1 g /69,8%/ and 149,9 g /52,8%/ resp.. High heat load in addition to its impairing effect on feed consumption is also therefore damaging, since it burdens heat regulating system of theorgan-

ism and thereby even reduced amount of nutrients taken by the birds is not utilized for production, but for alleviation of the heat load.

Influence of temperature on egg production of the Rhine geese

In investigating the effect of temperature on egg production Pavlov / / found that at temperatures above 15°C egg production of the geese was poorer than that of those, kept at 12-15°C. Jack-Resiers /1979/ observed 24% decrease in egg production of laying hens reared at 30°C as compared with those at 20°C. Authors' analyses revealed, that correlation between main daily temperature and egg production was weak $r = -0,2691$ /. Temperature and relative humidity were already in closer correlation $r = -0,3750$ / with egg production. That means that with increasing temperature, coupled with enhanced relative humidity, egg production is significantly repressed.

Heat load caused by high temperature may be diminished if shady space, cooled with irrigation, can be assured for the geese, or when instead of dry-keeping, raising on lake- or river-shore can be realized. This natural keeping is worthy of attention, because according to authors' measurements, in this way egg production may be enhanced by 6-20% as compared with dry-keeping at sites exposed to bright sunshine.

Also autumn egg production may be influenced by the environmental temperature. Naturally, most important role is not played by temperature even during this period, but its effect must be taken into consideration, because of the following:

Upon the effect of cold, heat production of the birds increases. The organism tends to counterbalance surplus heat production by means of surplus feed consumption. Upon the effect of higher feed consumption, feed passes through the digestive tract more quickly which results in impaired nutrient utilization. Thus, surplus feed uptake can not outweigh increased energy needs, consequently, the organism must turn to its energy reserves.

From the above considerations it is clear that in both cases fat enrichment of laying premises might be advantageous.

Supplementation of laying premises with fat

With fat supplementation not only exhaustion of the laying geese can be diminished, but the heat stress too, whereby egg production may be enhanced. Egg quality is markedly influenced by heat stress, lipide concentration in egg yolk /van Kampen, 1983/ and egg mass are lowered /Jack-Resiers, 1979/. Decrease in egg fertility and percentage hatchability is mainly caused by exhaustion of laying geese and ganders, and to a lesser extent by different environmental factors. Attempts are made to eliminate these negative effects with fat supplementation. By means of addition of surplus fat, heat stress caused by high ambient temperature may be reduced, since heat increasing effect of the fats is very low. Fat supplementation of 4-6% was thought to be adequate by Muskaraf-Vargas /1984/, while Reid /1983/ suggested tallow supplementation of 4-5%. According to Jensen /1985/ fat excess of 1-2% is already satisfactory.

By means of enrichment of the feed with fat powder, exhaustion of fat depots of laying geese may be diminished, thereby period of egg production can be prolonged and productional peak may be maintained for longer time space. The results of these experiments are presented on figure 1. With fat supplementation not only egg production, but also hatchability may be improved. Positive results are reported by Reid /1983/, Sanveur de Carville /1984/ too. Authors' results are summarized in

tables 1. and 2.

Figure 1. Effect of fat supplementation on the egg production /a/ and its fertility /b/

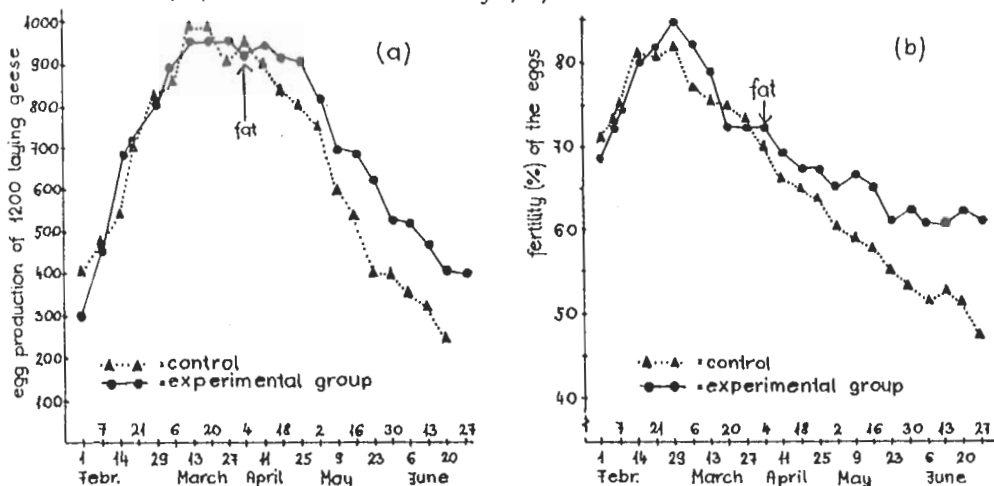


Table 1. Effect of laying premix enriched with 5% fat powder on egg production of Rhine geese under experimental conditions. /groups were selected from laying geese which laid more than 40 eggs in the first year./

Denomination	Control	Experimental group
Number of laying geese	20	20
Sex ratio	1:4	1:4
Average egg production /eggs/laying goose/	55,2	60,8
Fertility of eggs %/	64,3	67,8
Number of fertile eggs/laying goose	35,49	41,22

Table 2. Effect of feed supplementation with fat powder on egg production of Rhine geese under large plat conditions. /Petófi Farmers' Co-operative, Szakmár/

Denomination	Control	Experimental group
Number of laying geese	1200	1200
Sex ratio	1:4	1:4
Average egg production /eggs/laying goose	39,2	46,0
Fertility of eggs	79,8	78,6
Number of goslings/laying goose	29,0	34,5

From the experimental data it can be stated that with energy enrichment of the laying premix, both egg production and the number of hatched goslings may be enhanced. As to the fertility of the eggs, in one case increase /Table 1./ and in

another case a slight decrease /Table 2./ was experienced.

It will be the task of further research works to clarify, which were the factors playing most important role after supplementation of the feed with fat in hatching of the goslings: were eggs of higher biological value produced by the laying geese, or was activity of the ganders higher including improved sperm production and quality, etc.

Also further experiments are needed to establish, when and to what an extent should laying premixes be supplemented and what kind of fat powder should be consumed in order to obtain suitable performance.

Résumé

Il est connu, que pendant la production des oeufs la masse du corps des oies diminue, elles perdent presque totalement leurs réserves en matières grasses. Le rythme de la perte des réserves en graisses est accéléré par la hausse de la température d'été, parce qu'elle diminue l'appétit et fait accroître la production thermique. C'est pourquoi avec la hausse de la température, pendant le processus de la production des oeufs nous avons donné de la matière grasse en poudre en addition dans l'aliment des oies pondeuses.

Les expériences donnaient les résultats suivants:

1. il y a une corrélation $r = -0,3343$ entre la température moyenne journalière et l'utilisation des aliments.
2. la température et la teneur en vapeur relative donnait une corrélation $r = -0,4537$ avec l'utilisation des aliments.
3. le degré de la corrélation entre la température moyenne journalière et la production des oeufs est $r = -0,2691$.
4. la température moyenne et la teneur en vapeur donnent une corrélation plus grande $r = 0,3750$.

Sous l'effet de l'addition de la matière grasse en poudre dans l'aliment des oies pondeuses, la production des oeufs augmente /la période de la production des oeufs devenait plus longue et aussi la période de la production maximale/, la fertilité accroissait dans un cas, décroissait d'une façon minimale dans l'autre mais le nombre des oisons d'un jour augmentait dans tout les deux cas.

Zusammenfassung

Es ist wohl bekannt, dass während der Eiproduktionsperiode die Körpermasse von rheinischen Gänsen sich verringert und die Tiere verlieren ihre Fettreserven fast völlig. Das Tempo des Verlustes von Fettreserven wird durch Erhöhung der Sommer-temperatur beschleunigt, weil die einen appetitvermindernden Effekt ausübt, und fördert Wärme-Produktion. Deshalb, mit steigender Temperatur und fortschreitender Eiproduktion, Legefutter wurde mit Fettpulver ergänzt. Während der Versuche, es wurde festgestellt, dass

1. Korrelation zwischen täglicher Mitteltemperatur und Futterkonsumtion war im Werte von $r = -0,3343$
2. Temperatur und relative Luftfeuchtigkeit gaben eine Korrelation von $r = -0,4537$ mit Futterkonsumtion
3. Korrelation zwischen täglicher Mitteltemperatur und Eiproduktion war im Werte von $r = -0,2691$
4. Korrelation zwischen Mitteltemperatur und relativer Luftfeuchtigkeit war schon stärker $r = 0,3750$.

Unter dem Einfluss von Ergänzung des Legefutters mit Fettpulver, Eiproduktion wurde erhöht /Eiproduktionsperiode

und Periode mit maximaler Produktion wurde verL-ngert/. Die Fertilität hat in einem Falle zugenommen, in einem anderen Falle hat sich vermindert, aber die Zahl der Gänsekücken / Legegans wurde in beiden Versuchen erhöht.

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