# BODY WEIGHT CHARACTERISTICS OF FARM-RAISED FALLOW DEER (DAMA DAMA L.) OVER THE WINTER PERIOD

**P. Janiszewski*[1], B. Dmuchowski[2], A. Gugołek[1] and R. Żełobowski[1]**

*[1] University of Warmia and Mazury in Olsztyn, Department of Fur-bearing Animal Breeding and Game Management, Oczapowskiego 5/151, 10-719 Olsztyn, Poland, janisz@uwm.edu.pl

[2] Research Station of the Polish Academy of Sciences in Kosewo Górne, Poland

Manuscript received: October 31, 2007; Reviewed: June 11, 2008; Accepted for publication: June 23, 2008

## ABSTRACT

The aim of this study was to determine the body weight characteristics of fallow deer fawns and does over the period from weaning to the time the animals are put out to pasture, as well as to analyze seasonal variations in their body weights during the winter months. Before the winter the average body weights of fawns, 1.5-year-old does and older does were 24.30 kg, 35.64 kg and 44.60 kg respectively. After the winter the average body weights were as follows: fawns that spent the winter with does in the wintering ground – 22.98 kg, fawns that spent the winter under a shelter – 25.60 kg, does aged 1.5 years – 34.28 kg, does older than 2 years – 42.20 kg. It may be concluded that wintering under a shelter had a positive effect on the body weight gains of fawns.

**KEY WORDS: fallow deer, deer farming, body weight.**

## STRESZCZENIE

W pracy przeanalizowano masę ciała hodowanych fermowo cieląt oraz łań daniela europejskiego w okresie od odłączenia cieląt do wyjścia zwierząt na pastwisko. Wyodrębniono trzy grupy zwierząt: cielęta, łańki w wieku 1,5-2 lata oraz łanie w wieku powyżej 2 lat. Na teren kwatery zimowej zostały wypuszczone wszystkie łanie a wraz z nimi wypuszczona została grupa 23 cieląt. Pozostała grupa cieląt była zimowana pod zadaszonym kojcem. Średnia masa ciała cieląt przed zimowaniem wyniosła 24,30 kg, łań 1,5 rocznych 35,64 kg a łań starszych 44,60 kg. Po zimowaniu masa ciała przedstawiała się następująco: cielęta zimowane ze stadem łań 22,98 kg, cielęta zimowane w kojcu 25,60 kg, łanie 1,5 roczne 34,28 kg, łanie pow. 2 lat 42,20 kg. Wskazuje to, że zimowanie cieląt pod wiatą wpłynęło w korzystny sposób na przyrosty masy ciała w tym okresie.

**SŁOWA KLUCZOWE: daniel europejski, hodowla fermowa jeleniowatych, masa ciała.**

## DETAILED ABSTRACT

Celem pracy była charakterystyka masy ciała hodowanych fermowo cieląt oraz łań daniela europejskiego w okresie od odłączenia cieląt od matek (grudzień) do wyjścia zwierząt na pastwisko (maj) oraz analiza zmienności masy ich ciała w okresie zimowania. Wyodrębniono trzy grupy zwierząt: cielęta (73 osob.), łańki w wieku 1,5-2 lata (18 osob.) oraz łanie w wieku powyżej 2 lat (61 osob.). Na teren kwatery zimowej zostały wypuszczone wszystkie łanie a wraz z nimi wypuszczona została grupa 23 cieląt. Pozostała grupa cieląt była zimowana pod zadaszonym kojcem, który ograniczał niekorzystny wpływ warunków atmosferycznych.

Średnia masa ciała cieląt przed zimowaniem wyniosła 24,30 kg, łań 1,5 rocznych 35,64 kg a łań starszych 44,60 kg. Po zimowaniu średnie masy ciała przedstawiały się następująco: cielęta zimowane ze stadem łań 22,98 kg, cielęta zimowane w kojcu 25,60 kg, łanie 1,5 roczne 34,28 kg, łanie powyżej 2 lat 42,20 kg. Utrzymywanie cieląt w okresie zimowym pod wiatą wpłynęło w korzystny sposób na przyrost ich masy ciała w tym okresie. Osobniki te przyrosły średnio o 7,12% w porównaniu do masy ciała w miesiącu grudniu. Cielęta zimowane ze stadem łań straciły na masie ciała średnio 5,43%, a w porównaniu z cielętami zimowanymi pod wiatą 10,24%. Masa ciała łań 1,5 rocznych przed i po zimowaniu nie różniła się istotnie. U łań powyżej 2 lat wystąpił wysoki spadek masy ciała po zimowaniu, który średnio wyniósł 5,38%.


## INTRODUCTION

The history of modern deer farming dates back to the beginning of the 1970s. The first country in which deer farming became legal was New Zealand. The first farms were established there as early as in 1970 [6]. At present days there are about 50 such farms in Poland, and the total population of farmed animals of the deer family includes 1800 – 1900 fallow deer, 650 – 700 red deer and 150 sika deer [3, 4].

Professional literature provides scant information on changes in the body weights of farm-raised fallow deer kept under different housing conditions in the winter. Therefore, the aim of this study was to determine the body weight characteristics of fallow deer fawns and does raised on a farm, over the period from weaning (December) to the time the animals were put out to pasture (May), as well as to analyze seasonal variations in their body weights during the winter months.

## MATERIALS AND METHODS

The study was conducted on a deer farm belonging to the Research Station of the Institute of Parasitology of the Polish Academy of Sciences in Kosewo Górne. Today there are about 500 animals on this farm, mostly red deer and fallow deer. The numerical data analyzed in the study were the live body weights of fallow deer. The animals were divided into three groups, i.e. fawns aged up to 1 year (73 ind.), young does aged 1.5 to 2 years (18 ind.) and adult does older than 2 years (61 ind.). The animals were weighed twice, i.e. at the beginning of wintering (December 5, 2004) and at the end of wintering (May 5, 2005).

Does aged 1.5 and over 2 years and 23 fawns were let into the wintering area where they stayed under natural conditions. The other fawns spent the winter under a shelter situated in the wintering ground. The walls of the shelter were constructed of horizontal wooden boards and provided protection against the adverse impact of weather conditions. Under the shelter there was a feeding rack for haylage, water containers and feeding troughs for concentrated feed.

The animals were weighed in a catch pen located in the wintering area. Prior to weighing they were immobilized using a mechanical holding device, with sensors connected to the portable reader system of an electronic scale (Tru-Test, type JR 2000). The animals were weighed accurate to 0.5 kg.

In the winter the animals were fed grass haylage (ad libitum) and oat as concentrate. The amount of oat was calculated taking into account the number of animals in the wintering ground, and averaged 0.5 kg per adult and 0.3 kg per fawn. Mineral-vitamin supplements (SALVAmin Silage-P, type 4-press CU) were offered with concentrate. The concentrate was provided once daily. The animals had free access to water over the entire wintering period.

In order to characterize seasonal variations in the body weights of fallow deer in all experimental groups, the following statistics were calculated: arithmetic means, maximal values, minimal values and standard deviations. The significance of differences was estimated at $\alpha = 0.01$ and $\alpha = 0.05$ by one-factor analysis of variance, using STATISTICA 5.0 PL software.

## RESULTS AND DISCUSSION

### Body weight of fawns

Table 1 presents the average body weights (determined before and after the winter) of fawns which stayed with does in the wintering area, under natural conditions.

**Table 1.** Body weights of fawns that spent the winter in the wintering ground
**Tabela 1**. Masa ciała cieląt daniela zimowanych na terenie zagrody zimowej

| Time of weighing | N [animals] | $\bar{x}$ [kg] | $x_{min.}$ [kg] | $x_{max.}$ [kg] | SD |
|---|---|---|---|---|---|
| Before wintering | 23 | 24.30 | 21.5 | 27.5 | 1.71 |
| After wintering | 23 | 22.98 | 15.0 | 30.0 | 3.61 |

**Table 2.** Average body weights of fawns that spent the winter under a shelter
**Tabela 2**. Masa ciała cieląt daniela zimowanych pod zadaszeniem

| Time of weighing | N [animals] | $\bar{x}$ [kg] | $x_{min.}$ [kg] | $x_{max.}$ [kg] | SD |
|---|---|---|---|---|---|
| Before wintering | 50 | 23.90* | 15.5 | 30.0 | 3.17 |
| After wintering | 50 | 25.60* | 16.0 | 35.0 | 3.78 |

* - $P \leq 0.05$

**Table 3.** Comparison of the average body weights of fawns that spent the winter under a shelter and with does in the wintering ground
**Tabela 3.** Porównanie masy ciała cieląt daniela zimowanych pod zadaszeniem i na terenie zagrody zimowej

| Location | N [animals] | $\bar{x}$ [kg] | $x_{min.}$ [kg] | $x_{max.}$ [kg] | SD |
|---|---|---|---|---|---|
| Shelter | 50 | 25.60** | 16.0 | 35.0 | 3.78 |
| Wintering ground | 23 | 22.98** | 15.5 | 30.0 | 3.61 |

** - $P \leq 0.01$

After wintering the body weights of fawns were by 5.43% lower, compared to their body weights before wintering. However, there were no statistically significant differences between average body weights in this group of fawns. Attention should be paid to the fact that the variation in the body weights of fawns after the winter was twofold higher.

Table 2 shows the average body weights of fawns that spent the winter under a shelter, where the adverse impact of weather conditions was limited.

Over wintering the body weights of fawns of this group increased by 7.12%, and this difference was found to be statistically significant.

The body weights of fawns of both experimental groups after wintering are compared in Table 3. The data included in this Table show that fawns which spent the winter under a shelter, compared to those which spent the winter with does in the wintering ground, were characterized by higher (by 10.24%) body weights and a lower coefficient of variation within this trait. Differences between those two groups were statistically highly significant. It should also be noted that the maximum body weight of fawns that stayed under a shelter over winter was by around 5 kg higher, compared to the maximum body weight of fawns in the other group, while minimum body weights remained at a similar level in both groups.

Bruggemman and Schwark [1] described the growth of male and female fallow deer fawns raised on a farm. At the age of 6, 9 and 12 months, the average body weights of males and females were as follows 28.88 kg, 28.08 kg and 41.00 kg, and 25.45 kg, 22.53 kg and 31.08 kg respectively. Those data also testify to a decrease in body weight during the winter period, i.e. between 6 and 9 months of the animals' life.

According to Krzywiński (as cited in Dzięciołowski [2]), the average body weight of 3-month-old male and female fawns is 22.0 kg and 18.0 kg respectively. Mean daily gains during the first 5 months reach 0.19 kg in males and 0.15 kg in females.

Data collected in hunting grounds show that under natural conditions the body weight of fallow deer fawns increases fast until November or December, when it reaches approximately 60% of the body weight of an adult

**Table 4.** Average body weights of does aged 1.5 years before and after wintering
**Tabela 4.** Masa ciała łań półtorarocznych przed- i po okresie zimowania

| Time of weighing | N [animals] | $\bar{x}$ [kg] | $x_{min.}$ [kg] | $x_{max.}$ [kg] | S |
|---|---|---|---|---|---|
| Before wintering | 18 | 35.64 | 26.0 | 43.0 | 4.41 |
| After wintering | 18 | 34.28 | 24.0 | 39.5 | 3.85 |

Table 5. Average body weights of does older than 2 years before and after wintering
Tabela 5. Masa ciała łań w wieku powyżej 2 lat przed- i po okresie zimowania

| Time of weighing | N [animals] | $\bar{x}$ [kg] | $x_{min.}$ [kg] | $x_{max.}$ [kg] | SD |
|---|---|---|---|---|---|
| Before wintering | 61 | 44.60** | 36.0 | 53.0 | 4.11 |
| After wintering | 61 | 42.20** | 33.5 | 50.5 | 3.60 |

** - $P \leq 0.01$

doe. Then it gradually decreases, starting from January, to increase again in the middle of May [5]. The present study indicates that the development of fallow deer fawns is considerably affected by unfavorable weather conditions during the winter. That is why staying under a protective shelter contributed to a constant increase in the body weights of fawns over this period.

In an experiment performed by Mulley et al. [8] the birth weight of 16.7% from among 678 fallow deer fawns was as low as 3.4 kg or lower, and as a result only 54.9% of them survived until weaning.

**Body weight of does**

Table 4 presents the average body weights of does aged 1.5 years, determined before and after wintering. Their body weights were found to decrease by 1.36 kg (3.82% of the average initial body weight) during the winter, but this difference was statistically non-significant.

Table 5 shows the average body weights of does older than 2 years determined before and after wintering. Does of this group were characterized by lower body weights after the winter (by 2.4 kg, 5.38%) and a lower coefficient of variation within this trait. Highly significant differences in body weight were observed in this group.

Mulley et al. [8] reported that the average body weight of 1.5-year-old does in October was 36.7 kg, reaching 48.6 kg in adult does, which means that it was higher than noted in the present experiment.

A comparison of the numerical data in Tables 1, 4 and 5 shows that the decrease in body weight was the lowest in the youngest animals which spent the winter under natural conditions, i.e. in fawns (1.32 kg), followed by does aged 1.5 years (1.36 kg) and adult does (2.4 kg). This may suggest that the decrease in body weight recorded over winter may be dependent on the age of an animal. It seems that the oldest animals, whose growth and development are finished, are subject to greater variations in body weight, related to the season and life cycle.

Other authors reported that the body weight of a fawn is substantially affected by the body weight and age of a doe. Langbein and Putman [7] demonstrated that the average birth weights of male and female fawns born from multiparous does were 4.3 kg and 4.8 kg respectively, compared with 3.6 kg and 3.7 kg in the case of primiparous does.

## CONCLUSIONS

Wintering under a shelter had a positive effect on the body weight gains of fawns, which over this period increased by 7.12% on average. The body weights of fawns that spent the winter with does under natural conditions decreased by 5.43% on average, compared to their initial body weights, and by as much 10.24% in comparison with calves that stayed under a shelter during the winter. The body weights of 1.5-year-old does before and after wintering did not differ significantly. A considerable decrease (by 5.38% on average) was recorded after winter in the body weights of does older than 2 years.

## REFERENCES

[1] Bruggemann J., Schwark H.J., Growth of fallow deer, Monatshefte fur Veterinarmedizin. (1989) 44: 523-527.

[2] Dzięciołowski R., Daniel – monografia przyrodniczo-łowiecka, Wyd. SGGW, Warszawa (1994) [in Polish].

[3] Dmuchowska T., Dmuchowski B., Jelenie i daniele w zagrodzie. Top Agrar Polska (1997) 11: 48-51 [in Polish].

[4] Dmuchowski B., Krzywiński A., Hodowla fermowa jeleniowatych – światowe trendy a sytuacja w Polsce. Przegląd hodowlany (1997) 4: 17-18 [in Polish].

[5] Krupka J.(ed), Łowiectwo, Wyd. PWRiL, Warszawa, (1989) [in Polish].

[6] Krzywiński A., Hodowla fermowa jeleniowatych na świecie ze szczególnym uwzględnieniem aspektów ekonomicznych i trendów światowych, Przegląd hodowlany (1983) 5: 26-29 [in Polish].

[7] Langbein J., Putman R., Reproductive success of fallow deer in relation to age and nutrition, in: The biology of deer. Proceedings of the International Symposium on the Biology of Deer, Mississippi State University, 1990: 124-129

[8] Mulley R.C., English A. W., Kirby A., The reproductive performance of farmed fallow deer (Dama dama) in New South Wales. Austr. Vet. Journ., (1990) 67: 281-286.