

COMPARISON OF SOME REPRODUCTIVE TRAITS OF RABBIT DOES SELECTED FOR HIGH AND LOW BODY FAT CONTENT

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ABSTRACT

In this experiment body fat content of Pannon White rabbits was determined at 10 weeks of age using an EM-SCAN SA-3152 type Small Animal Body Composition Analyser (TOBEC method). Based on the fat content estimation the best and worst 16% of the does and the best and worst 8% of the bucks were chosen and mated each other (fatty doe with fatty buck and lean doe with lean buck). During the experiment the following data were recorded: conception rate, number of living born pups, number of dead born pups, litter size at 21 days, litter weight at 21 days and mortality of pups till the 21st day. The examination of changes in the conception rate showed that rabbits selected for high body fat content became pregnant in higher rate than rabbits with low body fat. They reached or exceeded the 75% conception rate three times from the five inseminations, while rabbit does selected for low body fat could realize this rate only once. In spite of the tendency observed in the conception rate non-fatty does showed better results in the case of litter size at birth. These animals produced litters with 9 or more pups in four cases, while fatty does reached this litter size only once, at their sixth parity. In the case of live born pups also the superiority of non-fatty does was observed till the fifth parity, but the differences between the groups have been changed compared to the total litter size. The reason of this could be find in the changes of dead born pups. Examined the mortality rate of pups during the suckling period (till 21 days of age) it was established that the mortality of the offspring of non-fatty does was higher as that of the offspring of fatty ones except the suckling period after the second kindling. As conclusion of this work it was established, that rabbit does selected for high body fat content mostly have higher conception rate, produce smaller litters at birth, but because of the lower mortality rate of their offspring during the suckling period they have larger and heavier litters at 21 day than the non-fatty ones. To determine the optimal body fat content of rabbit does for a long and effective production more details need.

Key words: rabbit, fat, selection, TOBEC, reproduction.

INTRODUCTION

It is widely known that the reproductive traits of rabbit does are markedly affected by several genetic and environmental factors. Among them the effect of housing, rearing

and nutritional conditions, the effect of season and genotype, the maternal effect and the effect of actual reproductive status were often studied in former experiments. The effect of body composition (particularly the effect of fat reserves) was, however, not a focus of these works, but in other species (O'DOWD *et al.*, 1997; ADAMCZEWSKI *et al.*, 1998), and also in some human cases (NORMAN and CLARK, 1998) it was already studied. As a result of these works it was concluded that body fat content has a significant effect on the reproductive performance of animals and women. It was pointed out that the extreme high and extreme low body fat content are equally unfavourable for the reproductive performance, which results in lower conception rate and litter size at birth and in grievous cases in the outage of oestrus. In this experiment we used the TOBEC (Total Body Electrical Conductivity) method for selecting rabbit does based on their body fat content to compare the reproductive performance of fatty and non-fatty animals.

MATERIAL AND METHODS

The experiment was carried out with Pannon White rabbits, which were kept in a closed building, in a cage of 800x500mm, under artificial lighting conditions (16 hours per day) and at a room temperature of 15-20 °C. For the *ad libitum* feeding of the animals a commercial pelleted diet (DE 10.30 MJ/kg, crude protein 17.5%, crude fat 3.6%, crude fibre 12.4%) was used. Drinking water was available continuously from self-drinkers.

At 10 weeks of age the animals were weighed and those that represented the average (average \pm standard deviation) in the live weight and in the daily weight gain between 6 and 10 weeks of age were chosen for the experiment. Their fat content was determined by an EM-SCAN SA-3152 type small animal body composition analyzer, by the so-called TOBEC method. All of the animals were measured three times and the average of these measures was used for further calculations. The coefficient of variation was under 2% in every case. The fat content of the rabbits was calculated from the values measured using a prediction equation developed formerly (MILISITS *et al.*, 2000).

Based on the predicted fat contents the extreme 16% of the does and the extreme 8% of the bucks were chosen for the experiment. Fatty does were inseminated with the sperm of fatty bucks and lean does with sperm of lean bucks. For every insemination fresh, attenuated (what does it mean?) sperm was used. At the first insemination (at 17 weeks of age) does were inseminated with sperm of bucks outside of the experiment, because the bucks chosen for this examination had not reach their breeding ability yet. For this reason the first kindling of the does was not evaluated.

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Your paper speak only of the initial fat content and thus only in the primiparous does you have simultaneously TOBEC estimations and performances. For all the other parity orders you should have only residual effects. Anyway, more details need:

1. Were the non pregnant does eliminated from the trial or not (it seems no)? if they continue to belong to their own group it is advisable that the fat content vary considerably during the trial.

2. If you don't have any figure of the body fat during the trial, in the fatty does, that were more pregnant, it is expected a stronger reduction of their body reserve and thus the initially fatty does could be the non-fatty during the trial. Please mention that the change of the fat content could affect strongly reprod. Parameters,

During the experiment following data were recorded: conception rate, number of living born pups, number of dead born pups, litter size at 21 days, litter weight at 21 days and mortality of pups till the 21st day.

Data were evaluated by Independent Samples T-Test and Chi²-test using the SPSS statistical software package (SPSS FOR WINDOWS, 1999).

RESULTS AND DISCUSSION

The most important data of the selected animals are summarized in Table 1.

Table 1. Liveweight and body fat content of the rabbits selected for the experiment

| Traits | Fatty | | | | Non-fatty | | | |
|-----------------------------------|----------------|-------|-----------------|-------|----------------|-------|-----------------|-------|
| | Does (n=63) | | Bucks (n=33) | | Does (n=57) | | Bucks (n=36) | |
| | Avg. | S. D. | Avg. | S. D. | Avg. | S. D. | Avg. | S. D. |
| Liveweight at 10 weeks of age (g) | 2280 | 140 | 2346 | 191 | 2305 | 174 | 2277 | 166 |
| Body fat (%) | 7.5 | 1.4 | 8.4 | 1.3 | 4.2 | 1.4 | 3.6 | 1.4 |

From these details it could be established that the predicted body fat content of fatty and non-fatty animals differed markedly from each other. The differences observed between fatty and non-fatty does and fatty and non-fatty bucks were also statistically proven ($P < 0.05$).

The examination of changes in the conception rate showed that rabbits selected for high body fat content became pregnant at a higher rate than rabbits with low body fat, except the insemination after the second kindling (Figure 1).

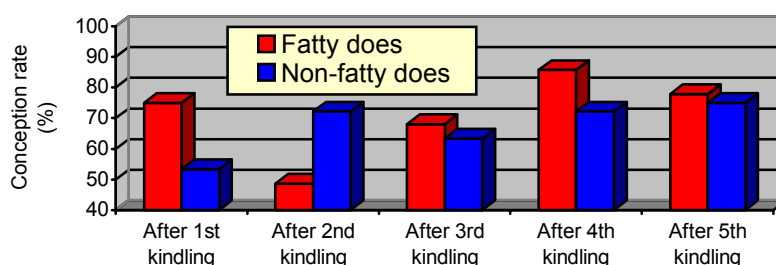


Figure 1. Changes in the conception rate of fatty and non-fatty does

In the case of fatty does the conception rate reached or exceeded the 75% three times from the five inseminations, while rabbit does selected for low body fat could realize this rate only once. The higher conception rate of the fatty does could be observed principally after the first ($P<0.05$) and fourth kindling.

Please attach some comments to explain the higher fertility of the primiparous does: the most sound statement is that during the first kindling does undergo to a severe energy deficit and thus fatty-does have enough energy to overcome such deficit

In spite of the tendency observed in conception rate the non-fatty does showed better results in the case of litter size at birth (Figure 2).

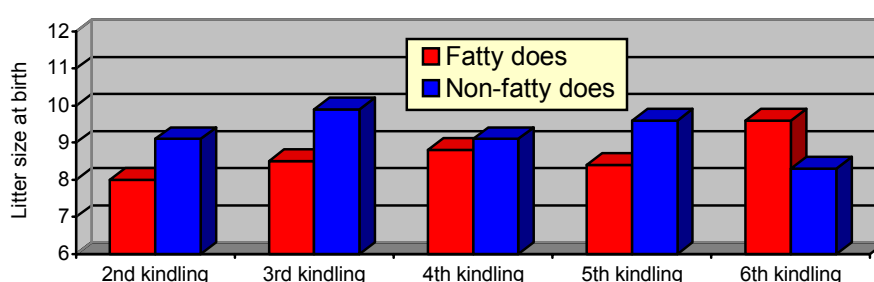


Figure 2. Changes in the litter size at birth of fatty and non-fatty does

Non-fatty does produced litters with 9 or more pups in four cases, while fatty does reached this litter size only once, at their sixth kindling. Because of the high variance of these values within the groups the litter size of the the groups are not statistically different.

Also in the case of live born pups the superiority of non-fatty does could be observed up to the fifth kindling, but the differences between the groups have been changed compared to the total litter size. The reason of this could be find in the changes of dead born pups, which is shown on Figure 3.

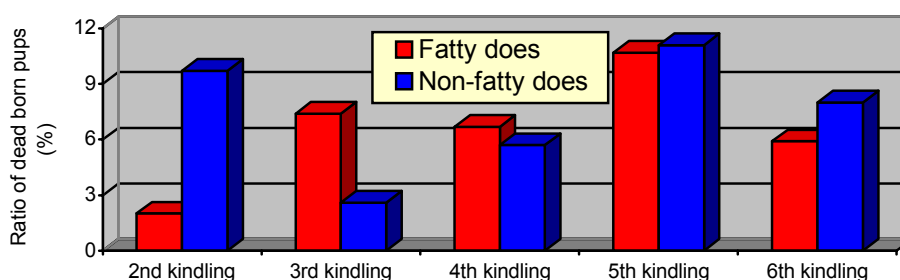


Figure 3. Changes in the ratio of dead born pups of fatty and non-fatty does

In the case of litter size at 21 days the worst results were also obtained after the fifth kindling in both group of the animals (Figure 4).

This low production could also be seen in the litter weight at 21 days in the case of non-fatty does, but fatty does produced litters with the same weight as before. I would add the graph of litter weight at 21d (to have an idea of the milk production in the different groups) and eventually I would delete the graph of the dead born pups.

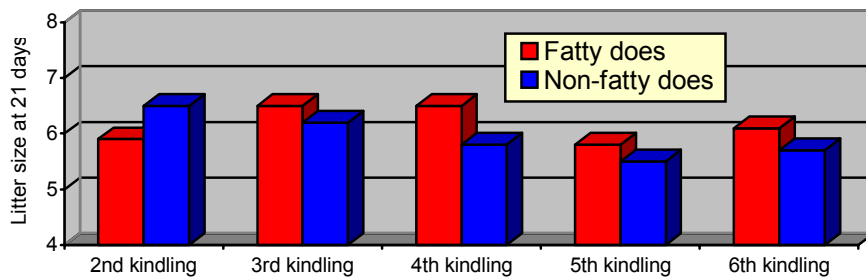


Figure 4. Changes in the litter size at 21 days of fatty and non-fatty does

The mortality rate of pups during the suckling period (till 21 days of age) showed that the mortality of the offspring of non-fatty does was higher than the offspring of fatty does, except the suckling period after the second kindling (Figure 5). The differences between groups were not significant in most cases, only after the 4th kindling.

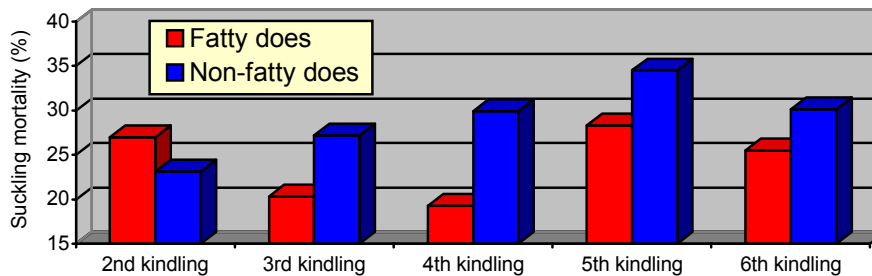


Figure 5. Changes in the suckling mortality of fatty and non-fatty does

The higher conception rate observed in the fatty does is in agreement with the findings of ADAMCZEWSKI *et al.* (1998) in muskoxen. In their work it was found that all measures of body mass, fatness and lean body mass were positively related to the probability of pregnancy, but the strongest relationships were found for total fat mass and kidney fat mass. The positive effect of kidney fat mass on the probability of pregnancy was pointed out also by HEARD *et al.* (1997) in moose.

In another work by WAHNER *et al.* (1995) it was observed that gilts with high backfat have a higher ovarian activity with more follicles compared with those having low backfat. In accordance with this O'DOWD *et al.* (1997) showed that the use of nutritional strategies to increase body fat reserves can improve fertility and longevity in genetically lean, young breeding sows. It was also established that in piglets from sows given fat-

supplemented diets, the survival as well as the body weight gain until weaning was greater.

Similar to the pigs, the high-fat diets had a positive effect on the litter size and litter weight at 21 days also in rabbits (PASCUAL *et al.*, 1998) as well.

CONCLUSIONS

Based on the results of this experiment it could be established, that rabbit does selected for high body fat content mostly have higher conception rate and produce smaller litters at birth, but because of the lower mortality rate of their offspring during the suckling period they have larger and heavier litters at 21 days than the non-fatty does. To determine the optimal body fat content of rabbit does for a long and effective production more details need.

ACKNOWLEDGEMENT

This research project was supported by a Hungarian OTKA grant (F 032594).

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