ECONOMIC EFFECTIVENESS OF THE RAPESEED OIL CAKE USE IN FARMED RED DEER RATION

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Abstract

Over the last couple of years, the volumes of rapeseed cultivation and consequently also those of the production by-product - oilseed cake – have been increasing in Latvia. Rapeseed oil cake is characterized by a high nutritive value. For providing of the required protein and energy levels optimum rapeseed oil cake feeding schemes have been elaborated and put in place for bovine animals, pigs and poultry. So far there have been few studies of rapeseed oil cake using in the farmed deer ration in Latvia, hence it is essential to evaluate the effectiveness of applying rapeseed oil cake as feed ingredient for farmed red-deer (*Cervus elaphus*) ration. The research study was targeted at effectiveness evaluation of feeding the rapeseed oil cake to farmed red deer (*Cervus elaphus*) over the winter period thus replacing the traditional ration of rolled grain of equivalent feed value.

The feeding trial was performed over the winter in 2010 with farmed red deer (*Cervus elaphus*). The trail included two groups of animals of identical age: the control (1) group (n_1=10) and the trial (2) group (n_2=10). The trial group received 0.200 kg of rapeseed oil cake replacing 0.450 kg of rolled grain in comparison with the control group. The effectiveness of the rapeseed oil cake in farmed red deer feeding was assessed at the end of the trial on the basis of the feed consumption and costs, and utilization of crude protein. The rapeseed oil cake ration of 0.200 kg per day for one deer over the winter period reduced the amount of consumed feed and expenses correspondingly by 3.2% and 8.13% in comparison with the control group. By feeding rapeseed oil cake decreased crude protein content in the excreted manure by 15.02%, t.e. increased feed crude protein utilization in deer organism by 6.18% in comparison with the control group.

Key words: deer, rapeseed oil cake, feed costs

Introduction

Breeding of wild animals including deer breeding is one of the most prospective, rapidly growing and non-conventional livestock sub-sectors in Latvia, potentially capable of export.70 farms were engaged in deer breeding in 2010. Basically red deer (*Cervus elaphus*) (66 %) and fallow deer (*Dama dama*) (12 %) are farmed. The main goal of deer breeding is acquisition of high quality venison in the highest possible quantities, because foreign experts are of opinion that the main source of income in deer-breeding is meat production (Fletcher J., 1989).Over the summer season red deer intake the necessary feed ration by pasturage without additional fodder. However, over the winter season red deer are exposed to the climatic conditions. Consequently, adult animals lose up to 20% of their body weight over the winter season (Fletcher J., 1989; Tuckwell C., 2003; Paeglītis D., et.al, 2006). To retain red deer body-weight over the winter period is possible enriched winter rations with high protein feeding stuff (Adam C.L., 1994, Huapeng C. et.al. 1997). In Latvia it is also possible to enrich red deer feed ration by protein containing feeding stuff, i.e. using rapeseed oil cake during the winter season. Rapeseed oil cake has a high nutritional value, since an average natural sample contains 35.0 – 45.0% of crude protein, 14.0-15.0% of total fat, 7.27 MJ/kg exchange energy and other nutrients. As a component of a traditional farmed red-deer ration, rapeseed oil cake can successfully replace a relevant amount of grain and provide animals with the necessary amount of crude protein.

The digestibility and utilisation of crude protein containing rapeseed oil cake in an organism of red deer characterised by the amount of undigested and unused crude protein in excreted manure (Osītis U., 2004). The excreted amount of undigested crude protein is causing economic losses due to defective use of feed (Patterson P.H., 1998). Hence, it becomes significant to evaluate the use of

rapeseed oil cake in red deer feeding compared with the use of traditional content feeding stuff. Under conditions of Latvia, no significant research in the deer breeding industry and comprehensive efficiency evaluation of feeding the rapeseed oil cake to farmed red deer.

Therefore the **research aim** was to assess the economic efficiency of the rapeseed oil cake using in winter diets of red deer.

Materials and methods

The feeding trial was carried out over the period of winter months in 2010 with farmed red deer (*Cervus elaphus*). The trial included two groups of red deer of same age: Group 1- the control group and Group 2 - the trial group. Each group consisted of 10 animals. Both groups (control and trial) of red deer received feed of equivalent value.

The content of feed ration was balanced corresponding to the season and norms of physiological needs for red deer organism (Fletcher J., 1989; Adam C.L., 1994). The composition of the ration ensured the intake equal amount of dry matter (2.6 kg), crude protein (320.7 g), and other nutrients.

The feed ration of the trial group contained rapeseed oil cake - 0.2 kg, rolled grain – 0.550 kg, haylage – 7kg per deer per day. The feed ration of the control group contained only rolled grain – 1.00 kg and haylage – 7kg per deer per day. The trial group received 0.200 kg of rapeseed oil cake replacing 0.450 kg of rolled grain in comparison with the control group.

The economic efficiency assessment of rapeseed oil cake containing feed ration included the determination of feed consumption by one deer and calculation of costs for the consumed feed; the analysis of crude protein content in taken up feed of red deer; and the calculation of undigested and excreted in manure crude protein amount and expenses per day.

Biochemical analyses of feed and manure were carried at the accredited biochemistry research laboratory of the Research Institute of Biotechnology and Veterinary Medicine “Sigra”, Latvia University of Agriculture (LATAK Registration No. LATAK-T-038-06-99-A) according to the standard LVS EN ISOIIEC 17025-2005, all the analyses were carried in compliance with the corresponding accredited ISO standards. The obtained data were processed using *Microsoft Excel* methods for data mathematical processing. Research data were analysed by a non-parametric method (Mann-Whitney U criteria test) for data comparison. Two independent variables – deer of control group (n_1=10) and deer of trial group (n_2=10) were compared at the essentiality level α=0.01.

Results and discussion

Rapeseed oil cake using as a feed ingredient for farmed red deer, reducing the amount of consumed feed by 0.250 kg or 3.2 % per day compared with the control group. Thus, decreasing also the costs of consumed feed (Table 1).

The costs of the feed consumed by one animal receiving rapeseed oil cake was by 8.13 % lower than the same costs for the control group. The difference in costs was related to the crude protein content in rolled grain and rapeseed oil cake.

Costs of protein in rapeseed oil cake are lower compared with rolled grain, i.e. utilisation of rapeseed oil cake in red deer feed ration is economically more profitable. One kilogram of protein in rolled grain costs LVL 0.82, while in rapeseed oil cake - LVL 0.57. The difference of protein costs per kg is LVL 0.25. The trial group of red deer received 0.200 kg of rapeseed oil cake (LVL 0.034) replacing 0.450 kg of rolled grain per deer (LVL 0.054) in comparison with the control group. Savings on feed ration costs per one deer equalled to LVL 0.02 per day.

Table 1

Feed and protein consumption and costs per red deer per day

Parameters	Group 1 - control		Group 2 - trial	
	amount	LVL*	amount	LVL*
In feed ration:				
haylage, kg	7.00	0.126	7.00	0.126
rolled grain, kg	1.00	0.120	0.550	0.066
rapeseed oil cake, kg	-	-	0.200	0.034
Total	8.00	0.246	7.750	0.226
% to control	100	100	96.87	91.87
Protein content to fed out feed ration, g	320.7	0.148	320.7	0.136
% to control	100	100	100	91.89

- feed costs are calculated according to the Central Statistical Bureau of the Republic of Latvia and Latvian Agricultural Consultation Centre Price Survey of 2009

Undigested and unutilised crude protein amount in excreted manure essentially characterises the digestibility and utilisability level of fed out crude protein in the digestive system of animals (Osītis U., 2004).

Feeding rapeseed oil cake, the organism of trial group red deer over the winter season consumed 75.23% of feed crude protein amount, i.e. 4.38% more than the consumed crude protein amount of the control group feed content (Table 2).

Table 2

Crude protein amount and costs in red deer feed and manure

(per one deer per day)

Parameters	Group 1 - control	Group 2 - trial	+/- to control group
Crude protein content in the excreted manure, g	93.47	79.43	- 14.04
Crude protein content in the excreted manure to control, %	100	84.98	- 15.02
Utilised crude protein in organism, g	227.23	241.27	+ 14.04
Utilized crude protein to control, %	100	106.18	+ 6.18
Utilised crude protein from taken up in organism, %	70.85	75.23	+ 4.38
Expenses of excreted crude protein, LVL	0.043	0.034	- 0.009
Expenses of excreted crude protein to control, %	100	79.07	- 20.30
Utilised feed costs, LVL	0.246	0.226	- 0.02
Undigested crude protein expenses of total utilised feed expenses, %	17.48	15.04	- 2.44

These data show that feeding of red deer by rapeseed oil cake, digestibility and utilisability of crude protein and total nitrogen was relatively higher compared with the control group. The trial group red deer excreted essentially (α=0.01, n_1=10, n_2=10) less (by 15.02%) undigested crude protein in manure compared with the control group red deer.

The undigested and excreted crude protein in manure causes economic losses due to defective feed utilisation. The expenses of taken up crude protein decrease by LVL 0.012 with the increase of feed digestibility level in the trial group, while the expenses of excreted crude protein decrease by LVL 0.009 per one deer per day.

In general, feeding the trial group red deer by rapeseed oil cake, expenses of undigested and excreted crude protein decreased by 20.30% compared with the control group (Table 2).

Feeding red deer by rapeseed oil cake, total feed consumption costs declined by 8.13% and the utilisation of crude protein contained by feed, including rapeseed oil cake, was more economically efficient. In the trial group expenses of undigested and excreted crude protein were by LVL 0.90 lower compared with the control group, i.e. losses of feed crude protein decreased by 2.44% calculated of total consumed feed costs.

Conclusions

The effectiveness of applying rapeseed oil cake as feed ingredient for farmed red-deer (*Cervus elaphus)* winter ration was evaluated under trial conditions replacing with it the traditional rolled grain of equal feed value. Feeding of the trial group red deer by rapeseed oil cake shows the following results compared with the control group:

1) reduced the amount of the feed consumed on the average by 3.2% per deer and feed costs by 8.13%;
2) crude protein amount utilised in an organism increased by 6.18%, while the expenses of excreted and undigested crude protein decreased by 20.30%;
3) losses of feed crude protein decreased by 2.44% calculating of total consumed feed costs.

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