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Economic Analysis of the Performance Traits in Holstein Friesian Bulls Fed Rations Including Sugar Beet Pulp at Different Levels

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Abstract: In this study, the gross profit and economic efficiency of adding sugar beet pulp, assessed as an alternative raw material at different levels in cattle rations were determined. A total of 15 Holstein Friesian bulls at 18 months of age were divided into 3 treatment groups each containing 5 bulls and fed for 154 days. Treatment groups were fed rations containing 60% compound feed and 40% roughage on dry matter basis. The control group (T1) was fed ration containing 60% compound and %40 roughage consisting of 40% dry meadow, 40% dry lucerne and 20% wheat straw, second group (T2) was fed ration including 60% compound and %40 roughage consisting of 40% dry meadow, 40% dry lucerne, 16% wheat straw and 4% sugar beet pulp, third group (T3) was fed ration including 60% compound and %40 roughage consisting of 40% dry meadow, 40% dry lucerne, 12% wheat straw and 8% sugar beet pulp. The T2 group was found to be the most profitable group as a result of the gross profit analysis, and it was detected that the T3 group was more efficient in terms of economic efficiency. As a result, it was found that adding sugar beet pulp into the ration of Holstein Friesian bulls increased the economic effectiveness and profitability.

Keywords: Holstein Friesian bull, performance, sugar beet pulp, gross profit, economic efficiency

Siyah-Alaca Tosun Rasyonlarına Farklı Seviyelerde Şeker Pancarı Posası İlavesinin Ekonomik Analizi

Öz: Çalışmada, büyükbaş hayvan besiciliğinde alternatif rasyon materyali olarak değerlendirilebilecek şeker pancarı posasının, rasyona farklı oranlarda dahil edilmesinin brüt kar ve ekonomik etkinliği tespit edilmiştir. Araştırmada, 15 adet 18 aylık genç siyah-alaca tosun, üç gruba ayrılarak 154 gün boyunca besiye alınmıştır. Deneme gruplarına kuru ağırlık cinsinden %60 kesif, %40 kaba yem verilmiştir. Deneme süresince, rasyonda bulunan %40 oranındaki kaba yemin; kontrol grubu (T1)'na %40'ı kuru çayır otu, %40'ı kuru yonca, %20'si buğday samanı olarak, ikinci gruba (T2), kaba yemin %40'ı kuru çayır otu, %40'ı kuru yonca, %16'sı buğday samanı ve %4'ü şeker pancarı posası olarak, üçüncü gruba (T3) kaba yemin %40'ı kuru çayır otu, %40'ı kuru yonca, %12'si buğday samanı ve %8'i şeker pancarı posası olarak yedirilmiştir. Brüt kar analizi sonucunda T2 grubu en karlı olarak belirlenirken, ekonomik etkinlik açısından ise T3 grubunun daha etkin olduğu tespit edilmiştir. Sonuç olarak siyah-alaca tosunlarla yapılan beside, rasyona şeker pancarı posası ilave edilmesinin ekonomik etkinliği ve karlılığı artırdığı tespit edilmiştir.

Anahtar Kelimeler: Siyah-Alaca tosun, performans, şeker pancarı posası, brüt kar, ekonomik etkinlik

1. INTRODUCTION

As a result of its geographical features, Turkey has the suitable properties and potential for any kind of animal production. Bovine breeding has the biggest share within the husbandry sector in terms of production and added value. Approximately 87.3% of the total red meat production is obtained from cattle, while 12.7% is obtained from small ruminants. As of 2013, the presence of cattle was 14 415 257 heads, that of sheep was 29 284 247 heads, and goat was 9 225 548 heads. Cattle meat production (99.3%) has the biggest share in red meat production in bovine breeding (ESK 2011).

Alınteri
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8 - 12
ISSN:1307-3311

Inadequate roughage production, which has an important place in ruminant animal feeding in Turkey, the decrease in the pastures and its quality, and the fact that the genetic capacity of the animal material is limited make it obligatory to increase the feed conversion efficiency in livestock.

Ensuring the use of economic feed in husbandry is quite important for the farmers, the country's economy and the effective use of the resources. In farm animal production, when animal purchasing costs are left out, feed expenses make up the biggest part of the total expenses at rates varying between 60 and 80%. When economics feed use is ensured, the profit obtained is increased as both unnecessary feed consumption is prevented and the animals are not kept in the establishment more than the desired period (Cinemre et al 1994).

Throughout the world, the use of food industry by-products, and especially sugar beet pulp, as a feed raw material has increased in recent years. The reason why one of the food industry by-products, sugar beet pulp is preferred is the fact that it is easy and cheap to add it into the ration of ruminant animals, it contains high level of carbohydrate, and it is consumed willingly by the animals due to sugar (Acar 2004). In Turkey, an average of 2.5 million tons of cossettes are produced annually in 25 sugar factories. The cossette produced in sugar factories of 20% by weight of the sugar beet delivered to the factories is distributed to the producers free of charge, and the remaining part is priced according to the market conditions and sold to the farmers. Approximately 65% of the cossette produced each year is distributed to sugar beet producers free of charge (TŞFAŞ 2013).

When the animals are fed on the rations with a fixed energy and protein content, they can get less or more energy and protein than they need. And this negatively affects the profitability of the livestock sector (Owens et al 1993). Studies aimed at choosing the suitable feed are important in terms of eliminating these negativities. Because it is reported that the animals can intake the nutrients that they need (James et al 2001; James et al 2002). However, the economic consequences of the alternative technologies should not be ignored while these technologies aimed at increasing the animal production (Finlayson et al 1995). Thus, it is inevitable to carry out feed selection works based on the objective to improve the performance. It is also reported that those engaged in livestock activities have to head towards new animal production techniques in order to be able to make economic production (Tatum et al 1992). That it was reported that new researches should be carried out for the feeding methods in addition to the selections applied for the suitable carcass to increase the profitability of livestock sector (Clarke & Rae 1991). An important objective for farmers in Turkey is to promote the use of agricultural and agro-industrial by-products for animal feeding in order to reduce the cost of animal production.

The objective of present study was to determine the effect of sugar beet pulp used at different levels in rations of Holstein Friesian bulls on the gross profit and economic efficiency.

2. MATERIAL AND METHODS

This research was carried out in Eastern Anatolia Agricultural Research Institute. A total of 15 Holstein Friesian bulls at 18 months of age were used animal material and divided into 3 treatment groups each containing 5 bulls. There was no significant difference among the groups in terms of average initial weights. Groups were fed rations containing 60% compound feed and 40% roughage on dry matter basis. The control group (T1) was fed ration containing 60% compound and %40 roughage consisting of 40% dry meadow, 40% dry lucerne and 20% wheat straw, second group (T2) was fed ration including 60% compound and 40% roughage consisting of 40% dry meadow, 40% dry lucerne, 16% wheat straw and 4% sugar beet pulp, third group (T3) was fed ration including 60% compound and %40 roughage consisting of 40% dry meadow, 40% dry lucerne, 12% wheat straw and 8% sugar beet pulp. Experiment lasted for 154 days. Feed was offered as ad-libitum for all of the groups. Animals had free access to water.

Feed intake was daily calculated by subtracting refused feed from given feed to animal in the morning. Body weights of the animals were determined biweekly. Average total weight gain was calculated by subtracting initial weight from final weight.

Alınteri
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The roughage and concentrate feed expenses were taken into account in order to calculate the operating costs. Labour, veterinary, vaccine-drug costs, maintenance-repair expenses, general administrative expenses, depreciation of buildings and equipment and other expenses were not taken into account because they do not vary among the groups. The economic analysis of the research was performed with the partial budget method (Aras 1988) as a result of the change made only in the feeding systems.

In order to determine the income of the farmer/farm, the total weight gain calculated for each animal during the fattening period was multiplied by the sales price of one kg of live weight gain of animal in year 2014. The gross profit was calculated by extracting variable expenses from the income obtained from the total live weight gain. And economic efficiency was calculated by proportioning the income to the expenses (Eliçin 1992). So, the income that is equal to 1 TL of feed cost is determined in economic efficiency.

3. RESULTS AND DISCUSSION

Results

During the fattening period, 1 274.1 liras of feed was given to the control group (T1), and 63.6% of this feed consisted of concentrate feed, 29% of dry lucerne and dry meadow hay of equal proportions, and 7.3% of straw. The total feed consumption of the second group (T2) costs 1 064.5 and that of the third group (T3) costs 915.8 liras. The sugar beet pulp was added into the ration at a rate of 0,3% in the second group and 0.6% in the third group on dry matter basis. The ratios of the other feed ingredients in the T2 and T3 groups are as 64.4% and 65.1% of concentrate, 14.7% and 14.9% of dry lucerne, 14.7% and 14.9% of dry meadow hay, and 5.9% and 4.5% of wheat straw (Table 1).

Table 1. Feed Consumption Value (TL) and Rates (%) for Treatment Groups

Feed Ingredients	**T1**		**T2**		**T3**	
	TL	**%**	**TL**	**%**	**TL**	**%**
Concentrate	810.8	63.6	685.2	64.4	596.4	65.1
Dry Lucerne	185.3	14.5	156.6	14.7	136.3	14.9
Dry Meadow Hay	185.3	14.5	156.6	14.7	136.3	14.9
Wheat Straw	92.7	7.3	62.6	5.9	40.9	4.5
Sugar Beet Pulp	0.0	0.0	3.4	0.3	5.9	0.6
TOTAL	**1274.1**	**100.0**	**1064.5**	**100.0**	**915.8**	**100.0**

The initial weights for T1, T2 and T3 groups were 305.5 kg, 323.3 kg and 317.4 kg, respectively. The total live weight gains during the fattening period were determined as 195,3 kg, 198.8 kg and 181.6 kg for T1, T2 and T3 groups. The live weight gains obtained were assessed with the market price (14 TL/kg live weight gain) and it was determined that they provided 2 734.2, 2 783.2 and 2 542.4 liras of gross income, respectively (Table 2)..

Table 2. Initial, Final and Total live weight gains (Kg) and Gross Incomes (TL) for Treatment Groups

Live Weights and Incomes	**T1**	**T2**	**T3**
Initial Weight (Kg)	305.5	323.3	317.4
Final Weight (Kg)	500.8	522.0	499.0
Total Weight Gain (Kg)	195.3	198.8	181.6
Gross Income (TL)	2 734.2	2 783.2	2 542.4

Gross profit and economic efficiency was calculated when the ultimate assessment of the experiment was made (Table 3). Gross profit analysis is of great importance in terms of gaining husbandry an effective working order and replaning it according to variable factors. Gross profit analysis is an ideal approach in terms of the comparison of variable factors (Aras, 1988). Gross profit values for T2, T3 and T1 groups were calculated as 1 718.7, 1 626.6 and 1 460.1 liras, respectively. While the most profitable group was T2 according to the gross profit results, it may be deceptive to make a decision solely on the gross profit results.

Alinteri
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The most important factors affecting the productivity in livestock sector are the performance of the animal and the rate of benefiting from the feed. The live weight gain obtained in kg and/or TL for each kg and/or currency of feed given is expressed as the state of benefiting from the feed or economic effectiveness. As a result of the present study, the gross income obtained in return for the effectiveness coefficient or the cost of 1 lira of feed was determined as 2,146 in T1, 2,615 in T2 and 2,776 in T3 group. T3 in the experiment was determined to be 6.2% more effective than T2, and 29.4% than T1. So, T3 has been the subject that variable factor most effective (Table 3).

Table 3. Gross Profit (TL) and Economic Effectiveness for Treatment Groups

Variable Expense and Income	T1	T2	T3
Variable Expense (TL)	1 274.1	1 064.5	915.8
Gross Income (TL)	2 734,2	2 783,2	2 542,4
Gross Profit (TL)	1 460.1	1 718.7	1 626.6
Economic Effectiveness	2,146	2,615	2,776

Discussion

Just as in the developed world countries, the husbandry system aimed at meat production is becoming increasingly more important, and the increase in meat demand and the fact that the production factors decreases day-by-day make it obligatory to develop intensive livestock production and increase the economic efficiency of the production factors. Livestock sector play a significant role in Turkey and is essential for the food security of rural population. Inadequacy of animal feed resources in both quantitatively and qualitatively is most often limiting factor of the development of livestock production. The decrease in the quality and the amount of the pastures requires the technically and economically effective use of the animal feed resources, which constitute an important input of animal husbandry.

According to the results of the gross profit analysis, T2 was determined as the most profitable group while T3 group was found to be more effective in terms of economic effectiveness.

As a result, it was determined that adding sugar beet pulp into the rations of Holstein Friesian bulls increased economic effectiveness, and thus the profitability. However, the economic optimum levels of sugar beet pulp on production performance traits of the animals could not be achieved as a result of the present study. So, further studies need to be performed to determine the technical and economic optimum points of the sugar beet pulp addition rates into the rations of Holstein Friesian bulls.

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Alınteri
30 (B) – 2016
8 - 12
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