EFFECT OF FEEDING DRIED DISTILLERS GRAINS WITH SOLUBLES (DDGS) TO MAGRA LAMBS ON WOOL YIELD AND WOOL CHARACTERISTICS IN ARID ZONE OF RAJASTHAN

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ABSTRACT

The present experiment was conducted on Magra lambs of 3-4 months of age at ARC-CSWRI for thirteen weeks to observe the effect of feeding dried distillers grains with solubles (DDGS) to Magra lambs on wool yield and wool characteristics. The lambs were used in a randomized block design and divided into four groups of 5 lambs in each group (T_1-T_4). The weight of greasy fleece yield (GFY) was recorded after complete shearing of lambs at the time of shearing. The wool samples for laboratory analysis were taken from mid-side region above the last pair of ribs. Each sample was collected as close to skin as possible, kept in zip lock polythene bags along with identification card. Thereafter, the wool samples were analyzed for quality analysis, which includes staple length, no. of crimp, medullation and fibre diameter. No significant effect of incorporation of dried distillers grain with solubles *i.e.* DDGS was observed on mean values of wool yield and all wool characteristics. It was concluded that DDGS can be incorporated in lamb ration up to level of 15% without having any detrimental effect on production performance in terms of wool yield and wool characteristics of lamb. Further, there was a tendency for some better production performance in terms of wool yield and wool characteristics in lambs receiving DDGS in their ration.

Key words: DDGS, Magra, wool yield and wool characteristics

Introduction

India has enormous livestock wealth and has great contribution to the livestock development in the world. Sheep plays an important role in rural economy of Rajasthan through gainful employment to large number of illiterate and socially backward farmers (Agrawal *et al*., 2018). Sheep rearing is an option of sustainable livelihood particularly in semi arid and arid region (De *et al*., 2015). Sheep is important component for rural economy with its multi facet utility for wool, meat, milk, skin and manure, and production of wool, meat and manure provide three different sources of income to the shepherd (Sarita *et al.,* 2018). To get profitable return from the livestock economical feeding with balanced nutrient to livestock is prime most requirement. Due to deficit of traditional feeds there is large gap between demand and supply. In India, there is a deficit of 23.40%, 11.24% and 28.90% in the availability of dry fodder, green fodder and concentrates, respectively (Roy *et al.,* 2019). Keeping in view this fact, non-conventional feeds may play a vital role to bridge this gap. In current scenario overall land for cultivation for tradition feeding sources is decreasing continuously which resulted in an increase availability of agro-industrial by-products (AIBPs) like brewer's dried grains, palm oil cake, winery mash etc., which can be efficiently utilized in livestock feeding. DDGS is also an agro industrial byproduct and it is obtained in fermentation process of cereal grains during ethanol production (Belyea *et al.,* 2004). Currently, DDGS is a most economic protein feed for livestock feeding and it competes most favorably with traditional protein feeds like groundnut meal and soybean meal. The high cost of protein supplements used in commercially manufactured lamb ration has attracted producer interest in inclusion of DDGS and other co-products in lamb diets. To determine the effect of feed stuffs on production parameters, it is necessary to evaluate the influence of feed upon wool yield and wool characteristics, particularly in adverse climatic conditions as exists in arid region like western Rajasthan. Therefore, present study was designed to evaluate the effect of feeding dried distillers grains with solubles (DDGS) in Magra lambs on wool yield and wool characteristics in arid zone of Rajasthan.

Materials and Methods

A thirteen weeks experiment was conducted on twenty 3-4 months old male Magra lambs at the sheep farm of ARC-CSWRI, Bikaner under "Network Project on Sheep Improvement of Magra Sheep". Animals were housed in well ventilated, hygienic and protected sheds. The experimental lambs were distributed in complete randomized block design into four groups having five lambs in each group. Four combinations of total mixed rations were prepared by substituting the groundnut cake with DDGS at different levels and were used for *ad lib* feeding of experimental lambs. Four isonitrogenous and isocaloric total mixed rations were prepared by using groundnut straw, ground nut cake, wheat bran, molasses, urea, mineral mixture, and salt with varying levels of DDGS at 0, 5, 10 and 15 per cent by using roughage to concentrate ratio of 60:40 (Table 1) and processed at feed processing plant of ARC-CSWRI, Bikaner.

The weight of greasy fleece yield (GFY) was recorded after complete shearing of lambs at the time of shearing. The wool samples for laboratory analysis were taken from mid-side region above the last pair of ribs. Each sample was collected as close to skin as possible, kept in zip lock polythene bags

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Table 1: Experimental total mixed ration for various treatments (% part ingredient composition)

Ingredient %	T_1 (Control)	T_2	T_3	T_4
Groundnut straw	60	60	60	60
Groundnut cake	15	10	5	0
DDGS	0	5	10	15
Molasses	10	10	10	10
Wheat bran	12	12	12	12
Urea	1	1	1	1
Mineral mixture	1	1	1	1
Salt	1	1	1	1

along with identification card. Thereafter, the wool samples were analyzed for quality parameters, which include staple length, no. of crimp, medullation and fibre diameter.

Statistical analysis

The data obtained in the experiment were analyzed statistically for effect of treatment in complete randomized block design as per Snedecor and Cochran (1994) and significance of mean differences was tested by Duncan's New Multiple Range Test (DNMRT) as modified by Kramer (1956).

Results and Discussion

The wool is an important production parameter of sheep and while studying the effect of incorporation of dried distillers grain with solubles in total mixed ration of lambs on growth and production status of sheep, it is necessary to analyze the various attributes of wool, either quantitative (wool yield) or qualitative (staple length, average crimp with fibre metrology *viz.* fineness and medullation percentage).

The mean values of greasy fleece yield (GFY) at the time of first shearing of different treatment groups of experiment have been presented in Table 2. The overall mean values for greasy fleece yield in lambs of different treatment groups at the time of first shearing were recorded to be 626.00, 639.00, 612.00, 681.00 g in T_1, T_2, T_3 and T_4 treatment groups, respectively. The statistical analysis of variance due to incorporation of dried distillers grain with solubles in total mixed ration revealed no significant effect on greasy fleece yield at the time of first shearing. Though, the highest greasy fleece yield was recorded in lambs of group T_4 followed by T_2, T_1 and T_3 treatment group.

The mean values of wool quality *viz.* staple length, average crimp with fibre metrology *viz.* fineness and medullation percentage of lambs under different treatment groups of experiment have been presented in Table 2. The mean values of fineness of wool of lambs at first shearing were recorded to be 37.08 µ in T_1, 36.64 µ in T_2, 36.68 µ in T_3 and 35.08 µ in T_4 group. The statistical analysis of variance due to incorporation of DDGS revealed no significant effect on average fineness of wool. The medullation per cent of wool due to effect of treatment *i.e*. incorporation of dried distillers grain with solubles in total mixed ration of experimental lambs at first shearing were recorded to be 53.30 % in T_1, 48.80 % in T_2, 45.10 % in T_3 and 45.02 % in T_4 group. The statistical analysis of variance revealed no significant effect on average medullation percentage of wool.

The hetero fibers per cent of wool due incorporation of dried distillers grain with solubles in total mixed ration of experimental lambs at first shearing were recorded to be 18.80 % in T_1, 23.50 % in T_2, 16.33 % in T_3 and 17.68 % in T_4 group.

Table 2: Effect of various levels of DDGS on wool parameters in lambs

Treatment Groups	Attributes						
	Wool yield (g)	Fineness (µ)	Medullation (%)	Hetero fibers (%)	Hairy fibers (%)	Staple length (cm)	Crimps (per cm)
T_1	626.00	37.08	53.30	18.80	37.50	5.54	1.15
T_2	639.00	36.64	48.80	23.50	33.00	5.94	1.00
T_3	612.00	36.68	45.10	16.33	30.10	5.92	1.18
T_4	681.00	35.08	45.02	17.68	31.04	6.04	1.06
SEM	66.116	0.743	4.634	2.841	5.755	0.734	0.126

The statistical analysis of variance revealed no significant effect on average hetero fibers percentage of wool. The highest hetero fibers percentage was observed in T_2 which is followed by T_3, T_4 and T_1 treatment groups. The hairy fibers per cent of wool due to effect of treatment i.e. incorporation of dried distillers grain with solubles in total mixed ration of experimental lambs at first shearing were recorded to be 37.50 % in T_1, 33.00 % in T_2, 30.10 % in T_3 and 31.04 % in T_4 group. The statistical analysis of variance revealed no significant effect on average hairy fibers percentage of wool. The highest hairy fibers percentage was observed in T_1 which is followed by T_2, T_4 and T_3 treatment groups.

The staple length (cm) of wool at first shearing were recorded to be 5.54 cm in T_1, 5.94 cm in T_2, 5.92 cm in T_3 and 6.04 cm in T_4 group. The statistical analysis of variance revealed no significant effect on average staple length (cm) of wool. The highest improvement in staple length was observed in T_4 which is followed by T_1, T_2 and T_3 treatment groups. The crimps (per cm) of wool due to incorporation of dried distillers grain with solubles in total mixed ration of experimental lambs at first shearing were recorded to be 1.15 per cm in T_1, 1.00 per cm in T_2, 1.18 per cm in T_3 and 1.06 per cm in T_4 group. The statistical analysis of variance revealed no significant effect on average crimps (per cm) of wool. The highest improvement in staple length was observed in T_3 which is followed by T_4, T_2 and T_1 treatment groups.

The findings of present study revealed that wool yield and other wool characteristics did not affected by the incorporation of dried distillers grain with solubles in lamb ration. These findings are in agreement with the results of Whitney *et al.* (2014); they also reported no effect of DDGS inclusion on wool characteristics in lambs. The findings of present experiment fall in the line with the study of Whitney *et al*. (2014) except for fiber diameter. They reported significant effect of DDGS on fiber diameter. The results corroborates well with the findings of Dimova *et al.* (2009) and McEachern *et al.* (2009). Though, in present investigation the wool yield and other wool characteristics did not vary significantly among various treatments but the numerical values were higher in DDGS incorporated groups which might be due to higher sulphur content of DDGS which helps in improved wool quality. Despite the lack of significant statistical differences in wool yield and wool quality, there was a tendency for some better production performance in lambs receiving DDGS.

Conclusion

In study, the wool yield and other wool characteristics did not vary significantly among various treatments but the numerical values were higher in DDGS incorporated groups. Therefore, it was concluded from present study that dried

distillers grains with solubles *i.e.* DDGS can be incorporated in lamb ration up to level of 15% without having any detrimental effect on production performance of the lambs. Although further investigation needs to be done with large population size and higher levels of DDGS incorporation to address the effect more precisely.

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