



## EFFECT OF FEEDING OF DRIED DISTILLER'S GRAINS ON CARCASS CHARACTERISTICS OF TELLICHERRY GOATS

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### ABSTRACT

A trial was conducted to assess the carcass characteristics of Tellicherry kids under feeding varying levels of dried distiller's grains in an organized goat farm, Injambakkam, Chennai. Thirty six numbers of Tellicherry male kids were randomly divided into four groups. The kids fed with concentrate and roughage in a ratio of 60:40 based on 4% body weight. The concentrate mixture contained varying levels of dried distillers grains (0, 5, 10 and 15%) and other ingredients. Pigeon pea (*Cajanus cajan*) straw was used as a sole source of roughage. The dressing percentage of Tellicherry kids was  $48.32 \pm 0.21$ ,  $49.14 \pm 0.66$ ,  $49.45 \pm 0.73$  and  $49.94 \pm 0.31$  for the diets containing 0, 5, 10 and 15% dried distillers grains respectively. The yield of edible offal was higher in groups supplemented with dried distiller's grains than control. The yield of non-edible offal, yield of primal meat cuts and meat, bone & fat percentage did not differ significantly among kids fed with varying levels of dried distiller's grains. Hence it can be concluded that inclusion of dried distiller's grains up to 15% in concentrate mixture did not affect the carcass traits of Tellicherry kids.

**KEY WORDS:** Dried Distillers Grains, Tellicherry kids, Dressing Percentage, Edible, Non-edible Offal, Primal cuts.

### INTRODUCTION

Goats play an important role in the rural economy of India, particularly in the arid, semi-arid and mountainous regions of the country. They are major meat producing animal whose meat (chevon) is one of the choicest meat and has huge domestic demand. According to the 20<sup>th</sup> livestock census (2019), the goat population in India is 148.88 million (DAHD Report, 2019). The country stands first in goat milk production and is the second largest meat producer in the world sharing 26.31% goat milk and 10.41% goat meat production (Miller and Lu, 2019). At present, the shrinkage of land availability for husbandry practices necessitates the farmers to adopt alternative management practices and to intensify their goat production to meet the increasing demand of chevon in the domestic as well as international markets (Tilahun *et al.*, 2013). Unlike traditional system, the expenditure on feed and fodder was the major component of the cost of goat rearing under intensive system and it accounted for 59 per cent of the total cost (Shalander kumar, 2007). Therefore, it was prudent on the part of farmers to economize on the feed cost to enhance profitability by using locally available agro-industrial by-product ingredients. Distiller's grain is an important agro-industrial by-product that results from the manufacture of beer as extracted residues of malt (generally barley). It is a good source of protein, energy, fiber and minerals and also contains a significant amount of rumen undegradable protein (approximately 55 per cent) which makes it an attractive ingredient to be used in ruminants feeding (Sahin *et al.*, 2013). Typical dietary inclusion level of dried distiller's grains in feed is approximately 20% for beef and dairy cattle, 10% for

swine and 5% for poultry on dry matter basis. At present, the use of dried distiller's grains in goat diet is not widespread when compared to other livestock industries. Hence, the present experiment is aimed to study the effect of inclusion of dried distiller's grains at various levels on the carcass characteristics of Tellicherry goats.

### MATERIALS AND METHODS

The trial was carried out in an organized goat farm, Injambakkam, Chennai, Tamil Nadu for a period of six months. Thirty six early weaned male kids aged around two months were selected and grouped into four as uniform as possible with regard to their body weight reared under intensive system. They were housed in lean to type asbestos roof sheds with rough kadappa floor which was partitioned into four sections by iron chain link. The floor space was provided at 0.4 m<sup>2</sup> per animal and provisions for feeding and watering arrangements were made hygienically as per standard methods. Wet distiller's grains were collected in clean polythene bags from the brewery industry. The fresh distiller's grains were spread on a large polythene sheet with one inch spread thickness and sun-dried for two days to minimize the moisture content. The distiller's grains were turned three times a day to improve the drying process and it was together and covered with polythene sheet in the evening. The concentrate mixture was prepared with sun-dried distiller's grains and the other ingredients as per calculated proportion for different treatment groups and percent ingredient composition of control and experimental concentrate mixtures are presented in Table 1.

**TABLE 1:** % ingredient composition of control and experimental concentrate mixtures

Ingredients	T1 (Control)	T2 (5% DDG)	T3 (10% DDG)	T4 (15% DDG)
Maize	44	40.5	37	33.5
Soya bean meal	10	8.5	7	5.5
Dried distillers grains	0	5	10	15
Mung chuni	28	28	28	28
Rice bran	15	15	15	15
Mineral mixture	2	2	2	2
Salt	1	1	1	1
Total	100	100	100	100

The concentrate and roughage fed separately in a ratio of 60:40 based on 4% body weight at morning and evening. Pigeon pea (*Cajanus cajan*) straw was used as a sole source of roughage. The kids were fed with concentrate at the rate of 300g per head per day during 2-4 months of age, 400g per head per day during 4-6 months of age and

550g per head per day during 6-8 months of age. Three animals from each group were selected randomly and slaughtered after completion of the experimental period. The live weight before slaughter and hot carcass weight were recorded individually for all groups and the dressing percentage was calculated as follows (Etchu *et al.*, 2012).

$$\text{Dressing percentage} = \frac{\text{Hot carcass weight}}{\text{Live weight}} \times 100$$

The weight of edible offal such as blood, liver, kidneys, heart, lungs and spleen and non-edible offal such as head, feet, stomach and intestines and skin were recorded and calculated in percentage from its live weight. The weight of different meat cuts such as neck, shoulder, breast, shank, rack, loin, leg and flank were recorded and expressed as percentage of the carcass weight. The meat, bone and fat were separated from each carcass and weighed. Their values were calculated in percentage from

its carcass weight. The data collected were statistically analyzed as per the procedures laid down by Snedecor and Cochran (1994).

**RESULTS AND DISCUSSION**

The mean ± S.E and analysis of variance of the dressing percentage of the kids fed varying levels of dried distillers grains are furnished in Table 2.

**TABLE 2:** Carcass characteristics (mean ± S.E) of Tellicherry kids fed varying levels of dried distiller's grains

Sl. No	Parameter	Levels of Dried Distiller's Grains				'F' value
		T1 (0% DDG)	T2 (5% DDG)	T3 (10% DDG)	T4 (15% DDG)	
1	<b>Dressing Percentage</b>	48.32 ± 0.21	49.14 ± 0.66	49.45 ± 0.73	49.94 ± 0.31	1.6746 <sup>NS</sup>
2	<b>Edible offal (as percentage of body weight)</b>					
	a) Blood (%)	2.89 ± 0.03	2.96 ± 0.06	2.96 ± 0.08	3.09 ± 0.06	1.8252 <sup>NS</sup>
	b) Liver (%)	1.95 ± 0.05	1.97 ± 0.06	2.00 ± 0.08	2.04 ± 0.02	0.5652 <sup>NS</sup>
	c) Kidneys (%)	0.33 ± 0.01	0.36 ± 0.03	0.33 ± 0.01	0.34 ± 0.01	0.6817 <sup>NS</sup>
	d) Heart (%)	0.49 ± 0.05	0.52 ± 0.04	0.50 ± 0.05	0.51 ± 0.02	0.0931 <sup>NS</sup>
	e) Lungs (%)	1.26 ± 0.04	1.25 ± 0.01	1.28 ± 0.03	1.36 ± 0.02	3.5504 <sup>NS</sup>
	f) Spleen (%)	0.16 ± 0.02	0.20 ± 0.01	0.20 ± 0.01	0.20 ± 0.01	3.667 <sup>NS</sup>
3	<b>Non-Edible offal (as percentage of body weight)</b>					
	a) Head (%)	7.22 ± 0.17	7.03 ± 0.40	6.76 ± 0.31	7.17 ± 0.20	0.5105 <sup>NS</sup>
	b) Feet (%)	2.60 ± 0.04	2.69 ± 0.13	2.80 ± 0.04	2.90 ± 0.03	3.1840 <sup>NS</sup>
	c) Stomach & Intestine (%)	9.50 ± 0.04	9.34 ± 0.30	9.77 ± 0.02	9.78 ± 0.06	2.0069 <sup>NS</sup>
	d) Skin (%)	7.69 ± 0.26	7.70 ± 0.25	7.47 ± 0.34	7.88 ± 0.23	0.3744 <sup>NS</sup>
4	<b>Primal cuts (as percentage of carcass weight)</b>					
	a) Neck (%)	7.39 ± 0.05	7.50 ± 0.10	7.48 ± 0.12	7.48 ± 0.13	0.2140 <sup>NS</sup>
	b) Shoulder (%)	20.91 ± 0.56	20.84 ± 0.78	21.05 ± 0.16	20.72 ± 0.60	0.0591 <sup>NS</sup>
	c) Breast (%)	5.68 ± 0.12	5.41 ± 0.08	5.55 ± 0.05	5.28 ± 0.25	1.3181 <sup>NS</sup>
	d) Shank (%)	9.58 ± 0.13	9.55 ± 0.13	9.68 ± 0.20	9.72 ± 0.15	0.2853 <sup>NS</sup>
	e) Rack (%)	9.46 ± 0.12	9.43 ± 0.06	9.86 ± 0.30	9.35 ± 0.23	1.3182 <sup>NS</sup>
	f) Loin (%)	8.24 ± 0.23	8.39 ± 0.22	7.94 ± 0.09	8.03 ± 0.15	1.2841 <sup>NS</sup>
	g) Leg (%)	29.80 ± 0.47	30.23 ± 0.12	29.81 ± 0.13	30.00 ± 0.03	0.6584 <sup>NS</sup>
	h) Flank (%)	5.73 ± 0.11	5.80 ± 0.03	5.68 ± 0.14	5.74 ± 0.04	0.2659 <sup>NS</sup>
5	<b>Meat, Bone and Fat (as percentage of carcass weight)</b>					
	a) Meat (%)	65.31 ± 0.25	64.84 ± 0.32	64.88 ± 0.32	65.32 ± 0.57	0.4709 <sup>NS</sup>
	b) Bone (%)	25.63 ± 0.49	25.65 ± 0.71	26.14 ± 0.52	25.61 ± 0.52	0.2044 <sup>NS</sup>
	c) Fat (%)	8.97 ± 0.38	9.60 ± 0.41	8.98 ± 0.28	9.10 ± 0.28	0.7602 <sup>NS</sup>

NS - Not Significant

The dressing percentage of Tellicherry kids was 48.32 ± 0.21, 49.14 ± 0.66, 49.45 ± 0.73 and 49.94 ± 0.31 for the

diets containing 0, 5, 10 and 15% dried distillers grains respectively. The dressing percentage did not differ

between the treatment groups. Gurung *et al.* (2009), Hutchens *et al.* (2012) and Van Emon *et al.* (2012) observed no significant difference in dressing percentage of goats fed varying levels of dried distiller's grains. The dressing percentage is higher in groups supplemented with distiller's grains due to higher feed conversion efficiency and better body weight gain (Felix *et al.*, 2011). The yield of edible and non-edible offal did not differ significantly among treatment groups. Luimes (2012) stated that yield of edible and non-edible offal and meat quality measurements were not influenced by different levels of dried distiller's grains.

Whitney and Braden (2010) studied the carcass traits of Rambouillet lambs by feeding varying levels (0, 6.6, 13.2 and 20 per cent) of corn dried distillers grains. They observed the feeding dried distiller's grains did not affect hot carcass weight, body wall thickness, dressing percentage and the weights of individual meat cuts. The yield of primal cuts and meat, bone and fat ratio did not differ significantly among treatment and control groups. Among the primal cuts, leg portion contributes major percentage of carcass weight. Schauer *et al.* (2008) observed hot carcass weight, leg score, conformation score, primal cuts, fat depth, body wall thickness, rib eye area and yield grade were not affected by inclusion of dried distillers grains up to 60% in lamb finishing rations. McEachern *et al.* (2009), Mckeown *et al.* (2010) and Schauer *et al.* (2008) suggested inclusion of dried distiller's grains in lamb finishing rations with no negative effects on feedlot performance and carcass traits.

## CONCLUSION

The above findings showed that carcass traits of Tellicherry goats supplemented with dried distiller's grains did not differ significantly over control group. The dried distiller's grains can replace a portion of soybean meal and maize up to 15 % of the concentrate diet. However, inclusion of dried distillers grains up to 15 per cent in concentrate diet as an alternative feed for goats.

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## Conflict of Interest

We declare that we have no conflict of interest.

## Authors Contribution

This work is a part of the MVSc thesis of first Author P. Arun Nehru and submitted to Department of Livestock Production Management, Madras Veterinary College, TANUVAS, Chennai, Tamil Nadu.

## REFERENCES

DAHD Report (2019). 20<sup>th</sup> Livestock Census-2019 All India Report, Ministry of Fisheries, Animal Husbandry & Dairying, India.

Etchu, K.A., Humbu, M.E., Ndamukong, K.J.N. and Agbor, E.B. (2012). Effect of varying levels of brewers dried grain on the growth performance of weaner rabbits (*Oryctolagus cuniculus*). *Greener J. Agri. Sci.* **2**, 237-245.

Felix, T.L., Zerby, H.N., Moeller, S.J. and Loerch, S.C. (2011). Effects of increasing dried distillers grains with solubles on performance, carcass characteristics and digestibility of feedlot lambs. *J. Anim. Sci.* **90**, 1356-1363.

Gurung, N.K., Solaiman, S.G., Rankins, D.L. and McElhenney, W.H. (2009). Effects of distillers dried grains with solubles on feed intake, growth performance, gain efficiency and carcass quality of growing Kiko × Spanish male goats. *J. Anim. Vet. Adv.* **8**, 2087-2093.

Hutchens, T.K., Smith, C., Andries, K., Johns, J.T., Rentfrow, G. and Aiken, G.E. (2012). Effects of dried distillers grains with solubles as a replacement for soybean meal and corn in diets fed to Boer-cross feeder kids. [www.uky.edu/Ag/Animal\\_Sciences/goats/goat.html](http://www.uky.edu/Ag/Animal_Sciences/goats/goat.html).

Luimes, P. (2012). Dried distillers grains with solubles (DDGS) is a viable option for feeding lambs. *Agricultural Adaptation Council*, 10-11.

McEachern, J.K., Whitney, T.R., Scott, C.B., Lupton, C.J. and Salisbury, M.W. (2009). Substituting distillers dried grains for cottonseed meal in lamb-finishing diets: growth, wool characteristics and serum NEFA, urea N and IGF-1 concentrations. *Sheep & Goat Res. J.* **24**, 32-40.

McKeown, L.E., Chaves, A.V., Oba, M., Dugan, M.E.R., Okine, E. and McAllister, T.A. (2010). Effects of replacing barley grain with triticale-based dried distillers grains with solubles on nutrient digestibility, lamb growth performance and carcass traits. *Can. J. Anim. Sci.* **90**, 87-98.

Miller, B.A. and Lu, C.D. (2019). Current status of global dairy goat production: an overview. *Asian-Australas J. Anim. Sci.* **32**, 1219-1232.

Sahin, T., Kaya, O., Aksu Elmali, D. and Kaya, I. (2013). Effects of dietary supplementation with distiller dried grain with solubles in growing lambs on growth, nutrient digestibility and rumen parameters. *Revue Med. Vet.* **164**, 173-178.

Schauer, C.S., Stamm, M.M., Berg, P.B., Stecher, D.M., Pearson, D. and Drolc, D. (2008). Feeding of 60% dried distillers grains in finishing rations results in acceptance lamb performance and carcass quality. *Sheep Goat Res. J.* **23**, 15-19.

Shalander Kumar (2007). Commercial goat farming in India: An emerging agri-business opportunity. *Agric. Econ. Res. Rev.* **20**, 503-520.

Snedecor, G.W. and Cochran, W.G. (1994). *Statistical Methods*, 6th Ed. Oxford and IBH Publishing Co., New Delhi.

Tilahun, S., Animut, G. and Urge, M. (2013). Effects of supplementing cassava leaf meal, brewers dried grain and their mixture on body weight change and carcass traits of

local goats fed urea treated Tef straw. *Livestock Sci.* **43**, 31-43.

Van Emon, M.L., Thompson, M.M., Kirsch, J.D., Vonnahme, K.A. and Schauer, C.S. (2012). Influence of the level of dried distillers grains with solubles on feedlot performance, carcass characteristics, blood metabolites

and semen quality of growing rams. *Small Rum. Res.* **103**, 156-160.

Whitney, T.R. and Braden, K.W. (2010). Substituting corn dried distillers grains for cottonseed meal in lamb finishing diets: carcass characteristics, meat fatty acid profiles and sensory panel traits. *Sheep & Goat Res. J.* **25**, 49-56.