SHORT COMMUNICATION

Growth Performance and Carcass Characteristics of Lambs Fed Concentrate Mixtures Containing Varying Levels of Palm Oil Decanter Cake

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Abstract

A study was conducted to evaluate the effect of feeding concentrate mixture containing varying levels of palm oil decanter cake (PODC) on growth performance and carcass characteristics in Nellore brown ram lambs. In a completely randomized design, 18 lambs were divided into three equal groups of six each and allotted to three dietary treatments (T_1 T_2 and T_3) comprising of green fodder Super Napier and concentrate mixture (20% CP) containing PODC at 0, 10, and 20%, respectively. The body weight gain (kg) and average daily gain (g/d) of lambs improved significantly ($p < 0.05$) at 20% level of PODC in concentrate mixture with non-significant differences in feed efficiency (kg feed/kg gain). Results revealed a significant decrease in feed cost/kg gain by Rs. 7.81 and 29.06 in T_2 and T_3 compared to T_1 control group. Carcass studies, however, revealed no effect on various carcass characteristics. It was concluded that PODC could be incorporated up to 20% in the diets of growing lambs for improved growth performance without altering carcass characteristics.

Keywords: Carcass characteristics, Growth performance, Palm oil decanter cake, Nellore brown rams lambs.

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Introduction

Small ruminants have an important role in the sustainability of village communities in the developing world, where they rely on forages available in common property resources. Raising sheep and goats for backyard farming or commercial-scale is cheaper and easier to manage than large ruminants and other livestock species. Agro-industrial by-products could be an alternative as cheap and sustainable feed resources for ruminants, and oil palm (*Elaesis guineensis*) industry produces annually large amounts of biomass available as potential animal feed such as oil palm frond (OPF), palm kernel meal/cake, (PKM/PKC), palm press fibre (PPF), palm oil mill effluent (POME) and PODC. Basically, PODC is produced by the extraction of solids from palm oil sludge (Seephueak *et al.,* 2011; Abubakr *et al.,* 2015). It is brown-blackish substance produced after passing through a process of decanting, centrifuging and then drying mechanically. PODC is a valuable and potential by-product that can be utilized as an alternative energy and protein source for growing ruminants. The data on utilization of PODC is scanty. Hence, the present work was taken up to study the effect of feeding concentrate mixture containing varying palm oil decanter cake levels on growth performance, carcass characteristics, and economics in Nellore Brown ram lambs.

Materials and Methods

The experiment was carried out on 18 Nellore Brown ram lambs for 90 days at the Department of Animal Nutrition, NTR College of Veterinary Science, Gannavaram, Andhra Pradesh. Palm oil decanter cake (PODC) used in the present study was procured from oil palm industries in West Godavari District, Andhra Pradesh. Eighteen Nellore Brown ram lambs (9-12 kg) of about 3 months age were randomly divided into three equal groups of six each, housed in individual pens with provision for individual feeding. Fresh, clean drinking water was provided to the animals *ad libitum* throughout the day. The lambs were dewormed before and at the middle of the growth trial. The ram lambs were offered diets (T_1 to

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T_3) containing 0, 10, and 20 % PODC in the standard feed, respectively, daily two times, *i.e.,* 9.00 am and 2.00 pm. The total supplemented concentrate was 1% of the body weight in each group. Green fodder was provided between 9.00 am and 3.00 pm and made available *ad libitum*, during the trial period of 90 days.

Initial body weight and weight of the animals at the weekly interval was recorded following standard norms. The animals were slaughtered, and live weights before slaughter were recorded. The stripping, legging, dressing, and evisceration were performed by adopting the standard method in practice. Carcass and non-carcass components were separated and weighed immediately after slaughter. The weight of the ingesta was computed as the difference between full and empty digestive tract. The empty body weight was computed as the difference between pre-slaughter weight and weight of the ingesta. The carcass was then divided into 5 wholesale cuts – leg, loin, rack, shoulder and neck, and foreshank and brisket as suggested by the National Livestock and Meat Board of United States of America. The proportion of the respective cuts was calculated based on hot carcass weight.

The data collected during the experiment were subjected to one-way analysis of variance and tested for significance level at 5% (Snedecor and Cochran, 1994).

Results and Discussion

In the present study, the inclusion of PODC at 20% in the feed improved body weight gain and average daily gain (ADG) ($p<0.05$) significantly as compared to the control, but DMI and feed conversion ratio were statistically non-significant (Table 1). Many authors (Gafar *et al*., 2013; Freitas *et al*. (2017; Macome et al. (2011) reported non-significant effects of the addition of PODC and PKC on weight gain and FCR lambs. However, Orunmuyi *et al.* (2006) reported increased ($p < 0.05$) weight gain in rabbits on PKC addition in feed of rabbits.

Further, the inclusion of PODC at 10 to 20% in the concentrate mixture resulted in a gradual and significant decreased ($p < 0.05$) cost of feed/kg gain by Rs. 7.81 and 29.06 in T_2 and T_3, respectively, as compared to the control (Table 2). Several authors (Shakila *et al.,* 2012; Sese *et al.,* 2014; Tareen *et al.,* 2017) also reported a significant decrease in feed cost/kg gain in poultry upon feeding PKC in the diets.

Table 1: Growth performance and economics of Nellore brown ram lambs fed concentrate mixture containing different levels of palm oil decanter cake

Particulars	*T_1 (n=6)*	*T_2 (n=6)*	*T_3 (n=6)*
Initial BW (kg)	12.94 ± 1.06	13.00 ± 1.02	12.79 ± 0.81
Average BW (kg)	17.97 ± 0.90	18.15 ± 0.68	18.60 ± 0.64
Weight gain (kg)*	5.03^{a} ± 0.26	5.15^{a} ± 0.44	5.81^{b} ± 0.20
ADG (g/d)*	60.28^{a} ± 3.13	62.05^{a} ± 5.40	70.00^{b} ± 2.42
DMI (g/d)	629.32 ± 17.74	645.19 ± 18.00	681.02 ± 14.61
FCR (g feed/g gain)	10.44 ± 1.59	10.40 ± 3.56	9.73 ± 0.88
Cost of feed/kg gain (Rs.)*	162.20^{c} ± 0.52	154.39^{b} ± 0.22	133.14^{a} ± 0.88

n=Number of animals or replicates, ^{abc}Values in the row differ significantly ($p < 0.05$).

Table 2: Carcass characteristics of Nellore brown ram lambs fed concentrate mixture containing different levels of palm oil decanter cake

Particulars	*T_1 (n=6)*	*T_2 (n=6)*	*T_3 (n=6)*
Pre slaughter weight (kg)	18.34 ± 0.34	18.74 ± 0.06	19.05 ± 0.23
Empty Body weight (kg)	15.38 ± 0.21	15.71 ± 0.22	16.12 ± 0.18
Hot Carcass weight (kg)	8.20 ± 0.001	8.40 ± 0.20	8.75 ± 0.15
Dressing percentage (%)			
(On live weight)	44.73 ± 0.83	44.82 ± 0.92	45.93 ± 0.23
(On empty weight)	53.33 ± 0.72	53.48 ± 0.51	54.26 ± 0.31
Fore saddle (%)	51.82 ± 0.35	51.53 ± 0.91	51.33 ± 0.13
Hind saddle (%)	48.18 ± 0.35	48.47 ± 0.91	48.67 ± 0.12
Wholesale cuts (% carcass weight)			
Brisket & Fore shank	10.89 ± 0.57	11.58 ± 0.37	11.63 ± 0.82
Shoulder & Neck	26.07 ± 0.02	24.85 ± 1.48	24.28 ± 1.96
Rack	14.85 ± 0.22	15.09 ± 0.95	15.43 ± 1.25
Loin	10.54 ± 0.17	10.00 ± 0.41	8.93 ± 1.00
Leg	37.65 ± 0.18	38.48 ± 0.49	39.75 ± 0.87

n=Number of animals or replicates, None of the traits differed significantly between treatments.

No significant effect of addition of PODC at 10 to 20% in the concentrate mixture on carcass characteristics such as pre-slaughter weight, empty body weight, hot carcass weight, dressing percentage, and wholesale cuts of lambs was observed as compared to the control (Table 2). These findings corroborated with the findings of Gafar *et al*. (2013) in Kacang goats, Orunmuyi *et al.* (2006) in growing rabbits, and Frietas *et al.* (2017) in feedlot lambs upon inclusion of PODC, PKC, and PKM, respectively, at different levels in the diet. Macome *et al*. (2011) also reported no significant effect on the proportion of commercial cuts in lambs fed diets containing varying levels of PKC.

Conclusion

Inclusion of PODC at 10% and 20% levels in the concentrate mixture significantly improved growth performance and decreased feed cost per kg gain but had no effect on the carcass traits like dressing percentage and wholesale cuts in Nellore ram lambs. Thus it was concluded that PODC could be incorporated up to 20% in the diets of growing ram lambs for improved growth performance and economical meat production without affecting the carcass characteristics.

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