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Addition of yellow grease to grain-based diets and taiwan grass on growth performance of finishing hair lambs

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Hair sheep breeds are well-adapted to the hot environments of tropical regions. Under these conditions, most of the feed stuffs have low protein and energy contents, and therefore, production efficiency is lower than that of wool breeds raised in cold environments and fed with high-quality diets. Fat supplementation in high-forage diets in cattle is a common strategy to increase diet energy density (Plascencia and Zinn 2018). A low-cost strategy to increase diet energy density is addition of yellow grease (YG). To our knowledge, inclusion of YG in diets for finishing hair lambs under tropical conditions has not been investigated. The objective of this study was to investigate effects of adding YG to grain-based diet on performance and carcass yield of finishing hair lambs.

The experiment was conducted on the experimental farm of the Facultad de Medicina Veterinaria y Zootecnia, Universidad Veracruzana, Veracruz, México. In the region, mean annual temperature is 24.5°C and mean annual rainfall is 1,516 mm. Sixteen male Pelibuey lambs (20.43±1.42 kg) were randomly assigned to one of two experimental diets with 0 and 3% YG (DM basis). Diets (Table 1) were formulated to cover nutritional requirements for 4- to 7-month-old finishing lambs with 30 kg BW (NRC 2007). Lambs were confined in individual pens equipped with feeders and water troughs and subjected to 12 days of adaptation. The growth performance trial lasted 75 days. Lambs were fed twice a day (8:00 and 16:00 h) and had free access to feed and fresh water. Body weights were recorded before the morning feeding on days 1, 15, 30, 45, 60 and 75 days. Dry matter intake (DMI) was measured daily as feed offered minus feed refused. Average daily gain (AGD) was calculated using body weight changes. Feed conversion was calculated as DMI/ADG. Offered feed samples were collected weekly and mixed as a composite sample. Crude protein, starch, ether extract and ash were determined by AOAC (2006). Neutral detergent fibre (aNDF), assayed with heat-stable amylase and expressed inclusive of residual ash (Mertens, 2002), and acid detergent fiber were analyzed (Van Soest *et al*. 1991). On day 75, after a 24 h fasting period, all lambs were slaughtered using procedures regulated by NOM–033-SAG/ZOO-2014. Immediately after slaughter, carcass weight was recorded to determine hot carcass weight, and then refrigerated for 24 h at 4°C to obtain cold carcass weight. Cold carcass yield was calculated by dividing the cold carcass weight by animal weight and multiplying the result by 100. Data were analyzed in a completely randomized design with a mixed model where treatment was considered fixed and lamb the random component in the model (SAS, 2008). The covariance structure that resulted in the lowest Akaike's information criterion was ARH (1). Because the time*treatment interaction was $P>0.05$, the results are shown as a general means. Significant differences were accepted at $P<0.05$.

Diets had similar percentages of energy and crude protein. The diet with 3% YG contained more EE and less starch as a result of the fat supplement and grain reduction percentage

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Table 1. Ingredients and chemical composition of experimental diets

Ingredient	Yellow grease	
	0	3
Dried brewers' grains, % DM	10.5	10.5
Sorghum dry grain, % DM	38	35
Soybean meal 48%CP, % DM	8	8
Cane molasses, % DM	10.5	10.5
Vitamins and mineral premix[1], % DM	3	3
Yellow grease, % DM	0	3
Taiwan grass, % DM	30	30
Chemical composition		
Dry matter, g/kg	66.1	63.5
Crude protein, g/kg DM	13.9	13.6
Etheric extract, g/kg DM	2.2	5.0
Neutral detergent fiber, g/kg DM	26.1	25.7
Acid detergent fiber, g/kg DM	12.3	12.1
Ash, g/kg MS	9.7	9.7
Starch g/kg MS	17.9	16.6
Metabolizable energy MJ/kg	10.10	10.14

[1]Ca, 180 g; NaCl, 180 g; S, 5 g; K, 5.6 g; Mg, 8 g; Zn, 50 g; Fe, 20 g; I, 0.5 g; Mn, 36 g; Co, 90 mg; Se, 90 mg; Vit. A, 3000 MIU; Vit. D_3, 750 MUI; Vit. E, 25 MUI.

Table 2. Effect of yellow grease on growth performance and yield carcass of finishing lambs

Parameter	Yellow Grease g/kg MS		
	0	3	SEM
Initial BW, kg	20.4	20.0	1.12
Final BW, kg	33.5	33.7	1.84
Total gain, kg	13.1	13.7	0.91
DMI kg/d	1.1	1.0	0.31
ADG kg	0.155	0.163	9.17
DMI/ADG	7.1^{a}	6.1^{a}	0.54
Hot carcass weight, kg	17.7^{b}	18.7^{a}	0.60
Hot carcass yield, %	52.8^{b}	55.4^{a}	0.89
Cold carcass weight, kg	16.1^{b}	17.2^{a}	0.50
Cold carcass yield, %	48.0^{b}	51.0^{a}	0.91

BW, body weight; DMI, dry matter intake; ADG, average daily gain; SEM, standard error of means. $^{a-b}$Means within rows with different superscripts are different at *P*<0.05.

in the diet. The addition of YG did not affect (P>0.05) final BW, total gain, DMI or ADG of hair lambs. Lambs fed YG had a better (P<0.05) feed conversion value as compared with lambs not fed YG. Hot and cold carcasses of lambs fed the diet with YG were heavier (P<0.05) than carcasses of lambs fed diet without YG, and therefore, hot and cold carcass dressing were improved (P<0.05) by YG (Table 2).

In our study, feed intake was not affected by YG. The effects of supplemental fat on feed intake have been inconsistent. In some instances, no negative effect on fibre digestion found, whereas in others markedly decreased, so the feed intake could be change. Plascencia and Zinn (2018) mentioned that the absence of effects supplemental fat on feed intake and NDF digestion can be explained by the capacity for postruminal compensation in NDF digestion. Awawdeh *et al*. (2009) found that dietary addition of 3% YG (DM basis) in finishing sheep, without increase feed intake, improved ADG as a result of high energy in the diet and better energy metabolism for growth performance.

The beneficial effects of YG on carcass weight and dressing are consistent with other studies evaluating supplemental fat in the diet. For example, Awawdeh *et al.* (2009) found that inclusion of 3.2% YG improves cold carcass weight. Dietary inclusion of soybean oil at 2% (Najafi *et al*. 2012) and 6% DM basis (Scarpino *et al*. 2016) increased carcass weight and dressing. As Weiss and Pinos-Rodríguez (2009) mentioned, replacing grain with fat significantly correlated with a fatness increase mostly to body reserves. We can conclude that YG would be an efficient alternative energy source for hair lambs under tropical conditions. Nevertheless, further research is required to determine the effect of YG on meat and carcass quality.

SUMMARY

Growing lambs were used to evaluate the effects of dietary inclusion of yellow grease (YG) on performance and carcass yield. Sixteen male hair lambs were assigned randomly to one of two diets with 0 or 30 g YG/kg DM and similar energy and protein content. Lambs underwent adaptation to diets for 12 d and fasting for 75 d. Dietary inclusion of YG did not affect growth performance or feed intake. Feed conversion, hot and cold carcass weight and yield improved by YG. The dietary addition of 30 g YG/kg DM allowed reducing the proportion of dietary grain without causing harmful effects on growth performance and feed intake but improving carcass dressing in finishing hair lambs. Given that its inclusion in grain-based diets improved carcass weights and yield. We can conclude that YG would be an efficient alternative energy source for hair lambs under tropical conditions. Nevertheless, further research is required to determine the effect of YG on meat and carcass quality.

REFERENCES

AOAC. 2006. *Official Methods of Analysis*. 18th edn. Association of Official Analytical Chemists. Washington, DC, USA.

Awawdeh M S, Obeidatb B S, Abdullahb A Y and Hananeha W M. 2009. Effects of yellow grease or soybean oil on performance, nutrient digestibility and carcass characteristics of finishing Awassi lambs. *Animal Feed Science and Technology* **153**: 216–27.

Mertens D R. 2002. Gravimetric determination of amylase-treated neutral detergent fibre in feeds with refluxing beakers or crucibles: collaborative study. *Journal of AOAC international* **85**: 1217–40.

Najafi M H, Zeinoaldini S, Ganjkhanlou M, Mohammadi H, Hopkins D L and Ponnampalam E N. 2012. Performance, carcass traits, muscle fatty acid composition and meat sensory properties of male Mahabadi goat kids fed palm oil, soybean oil or fish oil. *Meat Science* **92**: 848–54.

Plascencia A and Zinn R A. 2018. Comparative effects of "solid"—fat sources as a substitute for yellow grease on digestion of diets for feedlot cattle. *Animal Production Science*. https://doi.org/10.1071/AN16820

SAS. 2008. Statistical Analysis System. Statistics Software. Release 9.1.3, SAS Institute, Inc., Cary, NC, USA.

Scarpinov C F, Bertocco E J M, Pastori D A, Costa A M T, Leal P H and Castello B C. 2016. Feeding behavior, nutrient digestibility, feedlot performance, carcass traits, and meat characteristics of crossbred lambs fed high levels of yellow grease or soybean oil. *Small Ruminant Research* **137**: 151–56.

Van Soest P J, Robertson J B and Lewis B A. 1991. Methods for dietary fibre, neutral detergent fibre and non-starch polysaccharides in relation to animal nutrition. *Journal of Dairy Science* **74**: 3583–97.

Weiss W P and Pinos-Rodríguez J M. 2009. Production response of dairy cows when fed supplemental fat in low- and high-forage diets. *Journal of Dairy Science* **92**: 6144–55.