GOAT FEED PELLET FORMULATION WITH THE INCLUSION OF OIL PALM BY-PRODUCTS

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The goat industry in Malaysia is facing a very low self-sufficiency level (SSL) with only 11.4% in 2017 (DVS, 2018). The main factor contributing to this problem is high cost of feed materials, which are mostly imported. Due to the unsustainable supply of mutton throughout the year, Malaysia eventually importing more than 85.0% of mutton for local consumption. Local consumption of mutton increased from 20 076.7 t in 2010 to 40 388.0 t in 2017. This positive growth is attributed to economic and population growth accompanied by urbanisation, and religious practices of *aqiqah* and *qurban* rituals. In addition, consumer perception on nutritive value of mutton has changed from a misconception of high levels of cholesterol and saturated fat content to healthy red meat. This development creates a high market potential for the goat farming industry. In order to develop the goat industry, the feed resources that support production need to be diversified and expanded. In Malaysia, by-products from oil palm industry are seen as promising alternative components to goat feed as they are cost-effective and locally available throughout the year (Alimon and Wan Zahari, 2012).

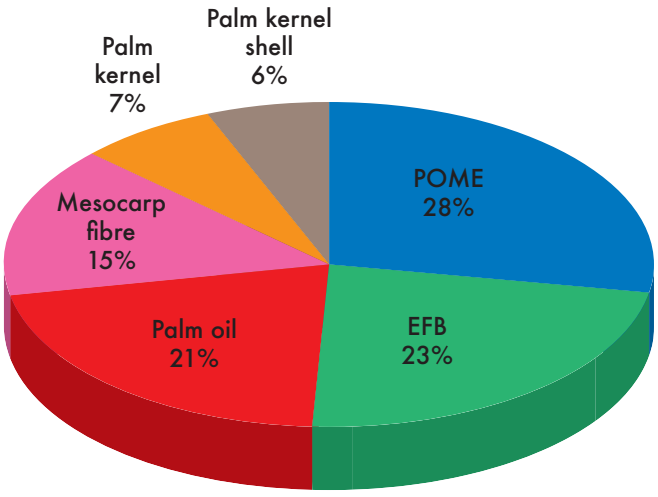

Figure 1. Components of fresh fruit bunches on wet basis (%).

By-products of the oil palm industry, which include palm oil mill effluent (POME), empty fruit bunches (EFB), mesocarp fibre (MF), palm kernel (PK) and palm kernel shell (PKS), have great potential to be used in the development of goat feed formulation. In 2017, the industry processed 99.70 million tonnes of FFB (MPOB, 2018) which generated different types of by-products as shown in *Figure 1*. These by-products include 27.92 million tonnes of POME, 22.93 million tonnes of EFB, 14.96 million tonnes of MF, 6.98 million tonnes of PK and 5.98 million tonnes of PKS. These statistics are indication that oil palm biomass is readily available for conversion into other value-added products (Onoja *et al.*, 2018).

Figure 2.Goat feed pellet with oil palm by-products inclusion.

THE TECHNOLOGY

This technology offers a nutrient-balanced and cost-effective goat feed pellet formulation using oil palm by-products (OPB) as the main ingredient (*Figure 2*). MPOB study showed that OPB-based pellet formulated using palm kernel cake (PKC), EFB, oil palm frond (OPF) and palm fatty acid distillates (PFAD) had a comparable palatability and growth performance of Katjang goats compared to commercial goat pellet.

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In this study, the treatment groups consisted of control - without oil palm by-products (CNT), commercial (COM) and OPB pellets. Feed formulations for both CNT and OPB pellets were developed to be isonitrogenous and isocaloric to COM pellet using FORMAT Software. Twelve goats of 12-month old were assigned to the three treatment groups and were kept in individual pen with free access to water. Each group was fed *ad libitum* of Napier grass and 1.5% body weight (BW) of the respective pellet per day. The goats were allowed for two weeks of adjustment period and the feeding trial was conducted for 14 weeks. The goats were weighed on the first day of the feeding trial and every week throughout the trial to determine changes in BW. Feed intake of each goat was recorded daily based on the differences in amount of feed offered and refused. The average daily weight gain was calculated by dividing the initial and final BW differences by the total number of experimental days.

Compared to CNT and COM, OPB pellet contains similar level of crude protein (CP) and gross energy (GE) content (*Table 1*). These two nutrients are the most important nutrients in the feed formulation. The OPB also contains a complete goat diet nutrient in accordance to the goat's nutrient specification and comparable to the commercial feed pellet.

The growth performance of Katjang goats fed with different pellets is shown in *Table 2*. There was no significant difference (P>0.05) in the initial BW among the treatment groups, which indicated the weight homogeneity of animals used in this study. At the end of the feeding trial, similar pattern of BW increment was observed, from 13.2 kg to 20.4 kg, 14.0 kg to 20.6 kg and 14.1 kg to 20.9 kg for CNT, COM and OPB, respectively. At this point, average daily gain (ADG) among all treatment groups was not significantly different (P>0.05). Although there was no significant difference, ADG of OPB group was numerically higher (68.88 g day^{-1}) than the goats in the COM group (66.84 g day^{-1}).

NOVELTY OF THE PRODUCT

- Inclusion of more than 50% oil palm by-products.
- No adverse effects on goat performance and growth.
- Availability of raw materials throughout the year.

TABLE 1. PROXIMATE ANALYSIS OF CONTROL (CNT), COMMERCIAL (COM) AND OIL PALM BY-PRODUCTS BASED (OPB) PELLETS

Proximate analysis	CNT	COM	OPB
Moisture content (% DM)	12.11	12.63	9.42
Ash (% DM)	10.72	6.90	7.74
Oil content (% DM)	5.59	4.00	4.36
Crude protein (% DM)	16.16	15.98	15.58
Crude fibre (% DM)	16.76	13.56	21.66
Gross energy (calorie g^{-1})	3 858	3 933	3 954

Note: DM – dry matter.

TABLE 2. GROWTH PERFORMANCE OF KATJANG GOAT FED WITH CONTROL (CNT), COMMERCIAL (COM) AND OIL PALM BY-PRODUCTS (OPB) BASED PELLETS

Parameters	Treatments			SEM
	CNT	COM	OPB	
Initial live weight (kg)	13.20	14.00	14.1	0.33
Final live weight (kg)	20.40	20.60	20.90	0.47
Total live weight gain (kg)	7.20	6.60	6.80	0.35
Average daily gain (g day^{-1})	72.96	66.84	68.88	3.62

Note: SEM – standard error of mean.

BENEFITS AND ADVANTAGES

The OPB-based pellet is able to provide a complete nutrient requirement for goat diet in accordance to the nutrient specification. The formulated feed pellet is also comparable to the commercial feed pellet in terms of growth performance of the Katjang goat. The inclusion of OPB in the goat feed pellet formulation did not have any adverse effect on the palatability of the pellet. Moreover, utilisation of OPB also contributed to potential cost savings for goat production.

ECONOMIC ANALYSIS AND COMMERCIAL BENEFITS

The estimated expenditures and other economic parameters for OPB feed formulation are shown in *Table 3*. This economic evaluation is based on the assumptions that the pellet is sold at a price of RM 0.96 kg^{-1}, the production capacity of 2000 kg hr^{-1} (with production operation at 8 hr day^{-1}, 24 days $month^{-1}$) and sales increase from the first year to the 10^{th} year.

TABLE 3. ECONOMIC ANALYSIS OF GOAT FEED FORMULATION WITH THE INCLUSION OF OIL PALM BY-PRODUCTS

Economic analysis	Value
Net present value (NPV), RM	1 837 761
Internal rate of return (IRR), %	34.53
Discounted payback period, years	3.7
Discounted benefit: Cost ratio	1.11 : 1

CONCLUSION

Goat feed formulation containing OPB offers cost savings and excellent nutrient content to support the national goat industry. This formulation would be an option for existing commercial feed millers and local farmers to venture into.

REFERENCES

Alimon, A R and Wan Zahari, W M (2012). Recent advances in the utilisation of oil palm by-products as animal feed. *International Conference on Livestock Production and Veterinary Technology (ICARD)*, Indonesia.

DVS (2018). http://www.dvs.gov.my/index.php/pages/view/1498, accessed on 30 October 2018.

MPOB (2018). Overview of the Malaysian oil palm industry 2017. MPOB, Bangi.

Onoja, E; Chandren, S; Razak, F I A; Mahat, N A and Wahab, R A (2018). Oil palm (*Elaeis guineensis*) biomass in Malaysia: The present and future prospects. *Waste Biomass Valori*: 1-19.

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