DEVELOPMENT OF COMMERCIALLY VIABLE DENSE TOTAL MIXED RATION (TMR) BRIQUETTES FOR DAIRY COWS USING LOCALLY AVAILABLE INGREDIENTS

By

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ABSTRACT

Development of commercially viable dense total mixed ration (TMR) briquettes for dairy cows using locally available ingredients.

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The current study was aimed to develop a commercially viable dense total mixed ration (TMR) briquette for dairy cows using locally available ingredients and evaluate the effect of this briquette on the production performances of dairy cows. Firstly, fodder species; maize (*Zea mays*), sorghum (*Sorghum bicolour*), CO3 (*Pennisetum purpureum* x *P. americanum*), gliricidia (*Gliricidia sepium*), and guinea grass – ecotype A (*Megathyrsus maximus*) and agro-industrial by-products; rice (*Oryza sativa*) bran, coconut (*Cocos nucifera*) poonac, maize (*Zea mays L.)* meal and soya bean (*Glycine max*) meal (SBM) were analyzed for proximate composition. Afterwards, six recipes were prepared by blending the above ingredients to fulfill the nutrient requirements of lactating dairy cows (300 kg body weight (BW), 10 L milk yield and 4.5 milk fat%). Then these recipes were pressed into briquettes appling hydraulic pressure and stored for 6 months. At six months a sample from each recipewas analysed for nutrient composition, shelf life and cost of production. Based on the cost of production and shelf life TMR recipe 5 and 6 were selected for further studies. Nine, Jersey x Sahiwal crossbred dairy cows with an average BW of 275 ± 33 kg were randomly assigned in to three treatments in a replicated, 3 x 3 Latin Square Design (LSD) consisting of 3-periods. Treatments were control (CTL) having guinea grass - ecotype A with commercial feed and the TMR recipe 5 (TMR1) and 6 (TMR2). Each experimental period consisted of a 14-d preliminary period for treatment adaptation and 21-d for the data collection. Between each period, there was a 14-d wash-over period.). Body condition score (BCS), body weight (BW), body temperature (BT), nutrient composition, particle size distribution, dry matter intake (DMI), nutrient digestibility, milk urea nitrogen (MUN), manure excretion, nitrogen (N) efficiency, milk yield, milk and fatty acid composition, sensory properties of milk, plasma metabolite and cost analysis were determined. The BCS, BW, BT and plasma metabolites were not shown any significant difference. Highest ($p<0.05$) coarse and fine particles were recorded in CTL and TMR briquettes respectively. There was no significant ($p>0.05$) difference in DMI. However, nutrient digestibility with respect to dry matter, ether extract, acid detergent fiber and neutral detergent fiber were significantly higher in TMR briquettes fed cows compared to CTL. The TMR briquettes had a lower urinary N excretions. Milk yield (CTL, TMR1 and TMR2 as 5.6 ± 0.56, 6.6 ± 0.56 and 6.0 ± 0.56 L day^{-1} respectively) and milk nutrient composition were not significantly ($p>0.05$) different among the treatments. Milk fat content was recorded for CTL, TMR1 and TMR2 as 3.8 ± 0.21, 3.5 ± 0.21 and 3.8 ± 0.21%, while MUN content was 12.9 ± 0.65, 12.9 ± 0.65 and 10.5 ± 0.65 mg dL^{-1}. There was no significant ($p>0.05$) difference in milk fatty acid profile among the treatments except for lauric acid (C12:0); where cows fed with TMR1 and TMR2 showed a significantly ($p<0.05$) higher lauric acid concentration compared to the control group. Further, all the sensory attributes were significantly higher in TMR1 compared to TMR2 and CTL. The least and the highest feed cost was recorded for TMR1 and CTL, respectively. Finally, the present study concludes that feeding TMR1 and TMR2 did not negatively affect the milk yield and composition, sensory properties, plasma metabolites and, DMI. Therefore, TMR1 (recipe 5) and TMR2 (recipe 6) briquettes could be used to overcome the inconsistent milk production during the forage scarce dry periods in Sri Lanka. Hence, providing TMR briquette may increase the farm economy by reducing feed costs.

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