EFFICACY OF FEEDING GRADED LEVELS OF DATE PALM (*Phoenix dactylifera*) SEED MEAL ON THE PERFORMANCE CHARACTERISTICS AND MILK QUALITY OF GOAT

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Abstract: The feeding value of Date palm seed meal (DPSM) (*Phoenix dactylifera*) was investigated in comparison with Groundnut cake using lactating goat (average initial weight = 14.5 kg). Lactating West African dwarf goats (n=12) were used for the experiment in a Completely Randomized design model for a six week period. The experimental Diets consist of A (0% DSM), B (1% DSM) and C (2% DSM). The results revealed a Crude Protein (CP) content of 9.15%, 8.37% and 8.57% in Diets A, B, and C, respectively. The ether extract content (EE) was 5.92 (A), 7.12 (B) and 8.90 (C). The Dry matter intake ranged from 1195.82 to 1206.35 g/d. The highest dry matter intake was recorded for Diet B. However, the Date seed meal based diets recorded numerically higher value compared to the control (Diet A). The Crude Protein intake was similar among all the diets. An interesting consequence of Date seed meal was the significant increase of Ether extract intake as the inclusion levels of Date seed meal increased in the diet. Conversely, the ash content was least for Diet C (2% DPSM) than Diet B (1% DPSM). The digestibility coefficient of the DSM based diet was significantly higher compared to the Control diet (A). Inclusion of Date seed meal in the diet of goat resulted in significant increase in the milk fat, protein, solids not fat, lactose and total solids. Additionally, the average milk yield was highest in diet B. Overall, the results indicate that Date seed meal had a high potential in the diet of lactating goat for better performance.

Keywords: Date seed meal, milk quantity and quality, performance characteristics

Introduction

Date palm (*Phoenix dactylifera*) is a dioecious perennial monocotyledon fruit plant domesticated for at least 5000 years ago. It was believed to be a native of the Arabian Gulf region, possibly in Southern Iraq (Wrigley, 1995). In several tropical countries, Date palm plays a vital social , environmental and economic role because it constitute the principal resource and food source of oasis cultivars and contributes to the development of subjacent cultures (Sidina, 1999).

Date palm (*Phoenix dactylifera*) is also one of the oldest fruit trees in the world and the number of the Date palm is about 100 million worldwide and about 62 million are found in the Arab world.

Date provides several nutrients like calcium, fiber, amino acids, sulfur, iron, magnesium, phosphorus, copper, potassium and fat. It is rich in vitamin A1, B1, B2, B3, and B5. The fruit is low in sodium content thereby preventing high blood pressure. Date contains fluorine which is an essential mineral to slow down the process of easy tooth decay. Date prevents intestinal disturbances. It is high in calories and helps in putting on weight (5-6 Dates /day).

Date seeds are poor in protein (5-11%), the oil is between 4 and 14%. The fibre content is between 16 and 51%, neutral detergent fibre , 55-90% acid detergent fibre, 41-46% and acid detergent lignin, 4-18% (Boudechiche, 2009). The seeds have appreciable potassium, phosphorus, magnesium and calcium but low sodium. Iron, manganese, zinc and copper (Barreveld, 1993). The nutritive potentials of Date seed in ruminant nutrition are not well elucidated in literature. It was noted that date seed meal could be used to balance up a diet where the basic components are too rich in protein such as young pasture (Al-wash *et al*., 1982).

Al-Yousef *et al*. (1993) reported an in-vivo dry matter digestibility of between 58 and 70% for Date seeds. Organic matter digestibility value was higher than 80% as reported by Al-kinani *et al*. (1975). Protein digestibility was less than 40% (Al-Wash *et al*., 1982). The average daily gain of calves fed date pits (seed) was not affected when the inclusion levels increased from 30 to 60% in a concentrate diet (Farhan *et al.,* 1969). The feeding of Date seed meal in the diet of sheep enhanced weight gain at 75% level of inclusion (Al-Kinani *et al*., 1975).

Additionally, when 50% of Date seed meal was supplemented with urea in a mixed diet of sheep resulted in increased weight gain and improved carcass traits (Younis *et al*., 1981). Inclusion of 30% date pits in the diet of sheep fed Atriplex helium hay and concentrate diet resulted in increased weight gain. Replacement of barley grain with 45% Date pits had no effect on total feed intake and in- vivo dry matter digestibility. It was also noted that inclusion of Date pits in the diet of animal increased crude fibre digestibility which showed higher fibre digestibility of Date pits compared to that of barley grain and that Date pits may prevent acidosis better than barley (Al-owaimer et *al*., 2011).

Unprocessed Date seeds are excellent slow release energy for camels during long desert journey (Barreveld, 1993). The thrust of this study was to evaluate the effect of Date palm seed meal (DPSM) on feed intake, digestibility coefficient, milk quantity and quality of lactating goat.

Materials and Methods

Experimental site

The experiment was conducted at the Animal Pavilion of the Teaching and Research Farm, University of Ilorin, Nigeria. The latitude and longitude of Ilorin was 8^0 49'N and 4^0 54' while the average temperature of the University of Ilorin is between 23.7 and 28.7^{0}C, and humidity of between 49.2 and 90.6 (Yusuf and Akoshile, 2011).

Collection of Date seeds

The fruits were obtained from sellers in Ilorin metropolis and the seeds were extracted from the whole Date palm fruits through removal of the seeds from the Date palm fruit. The seeds were later air dried for few days after which they were oven dried at 70^{0}C for about 2-3 days. The dried seeds were milled (Meal) and stored till required.

Experimental animals and management and diets

Twelve healthy pregnant West African dwarf goats used for the study were replicated four times against the experimental diets. The animals were monitored for any infection and later kept in individual cage for better adaptation to the environment. During the eight weeks experiment, the animals were fed and water *ad libitum* throughout the *experimental period.*

The milled Date seed was used to replace Cassava waste in the Experimental Diets B and C at 1 and 2% levels respectively while Diet A was the Control without Date seed meal. Other ingredients are of fixed proportions. The experimental animals were fed at 0.800 in the morning and 15.00 h in the afternoon.

The digestibility of the feed by the animals was done immediately after the preliminary and adjustment period of 14 days. The total faecal voided and the feed intake was recorded for 21 days so as to calculate the digestibility coefficient. After the digestibility coefficient the daily feed intake was noted by recording the Feed offered and orts daily before new morning feeding so as to capture the feed intake per day.

Milk quality and quantity

The animals, which were in their advanced stage of the pregnancy and kidded three months into the experiment and the milk quantity and quality was collected for 8 weeks.

Chemical analysis

The dry matter of the faeces and feed was determined at 100^{o}C for 24 h while the remaining samples were oven dried at 70^{o}C for 24 h and the proximate composition (crude protein, crude fibre, ether extract) was determined according to the procedure of AOAC (1990). The milk quality was determined using Lactoscan.

Statistical analysis

All data collected was subjected to Analysis of Variance of a Completely Randomised design model (Steel and Torrie, 1980) while means were separated using Duncan (1955) multiple range test.

Results and Discussion

The composition of the experimental diets is as shown in Table 1. The Date seed meal was included in the experimental Diets B and C at 1 and 2%, respectively; while the control diet A had no inclusion of the Date seed meal. Meanwhile, Table two shows the proximate composition of Date seed meal. zThe results of the chemical composition are as shown in Table 3. The dry matter was 91.0% (A), 89.0% (B) and 89.0% (C). The crude protein content of Diets A and C was numerically higher than B. The ether extract content of diet A was the least (5.92%) followed by Diets B and C in that order. The crude fibre content decreased as the inclusion levels of Date seed meal increased in the diets. Additionally, the ash content followed the same trend as the fibre content.

Table 1: Composition of the experimental diets

Ingredient	Diet A (Control)	Diet B	Diet C
Cassava waste	54.00	53.00	52.00
Rice husk	35.00	35.00	35.00
Groundnut cake	10.00	10.00	10.00
Date seed meal	0.00	1.00	2.00
Salt	0.50	0.50	0.50
Vitamin premix	0.50	0.50	0.50
Total	100.00	100.00	100.00

Table 2: Proximate composition of Date seed meal

Parameter	Percentage
Dry matter	96.30
Crude protein	13.15
Crude fibre	1.55
Ether extract	4.60
Ash	2.10

Table 3: Chemical composition of the experimental diets

Parameters (%)	Diet A	Diet B	Diet C
Dry matter	91.00	89.00	89.00
Crude Protein	9.15	8.12	9.13
Crude fibre	54.50	45.95	41.53
Ether extract	5.92	7.12	8.90
Ash	8.65	9.35	7.12

The consumption of the experimental diets shown in Table 4 revealed a dry matter intake of 1195.82, 1206.35 and 1196.24 g/day for Diets A,B and C respectively. The crude protein intake ranged from 100.8 to 109.4 g/day. The highest ether extract intake was recorded for Diet C followed by B and the least was A (Control). Conversely, the highest crude fibre intake was noted in Diet A (control) > B > C. The ash intake was greatest for B, greater for A and great for C.

Table 5 shows the digestibility coefficient of the experimental animals. There were significant differences among all the Diets (A, B and C) in every parameter evaluated. The Date seed meal based diets (B and C) recorded highest dry matter digestibility, crude protein digestibility and ether extract digestibility compared to the control (diet A).

Table 4: Feed consumption of the experimental animals (g/d)

Parameter	Diet A	Diet B	Diet C	±SEM
Dry matter	1195.82	1206.35	1196.24	47.78NS
Crude Protein	109.42	100.97	102.52	2.81NS
Ether extract	70.79^{a}	85.89^{ab}	106.47^{b}	3.66*
Crude fibre	651.72	554.32	496.79	24.56NS
Ash	103.44^{ab}	112.79^{b}	85.17^{a}	2.33*

Table 5: Digestibility coefficient of the experimental animals

Parameters	Diet A	Diet B	Diet C	±SEM
Dry matter	97.89^{a}	98.33^{b}	98.12^{ab}	0.13
Crude protein	98.03^{a}	98.39^{ab}	98.77^{b}	0.12
Ether extract	97.83^{a}	98.09^{ab}	98.74^{b}	0.14
Crude fibre	98.73^{b}	98.60^{ab}	98.29^{a}	0.11

Table 6: Milk quantity and quality of the experimental animals

Parameters	Diet A	Diet B	Diet C	±SEM
Fat (%)	5.35^{a}	7.95^{c}	5.78^{b}	0.07*
Density	32.09^{a}	33.72^{b}	33.25^{b}	0.23*
Conductivity	3.59^{b}	3.20^{a}	3.23^{a}	0.03*
Solids not fat (%)	9.49^{a}	10.21^{c}	9.87^{b}	0.06*
Protein (%)	3.55^{a}	3.83^{b}	3.77^{b}	0.04*
Lactose (%)	5.00^{a}	5.37^{c}	5.21^{b}	0.03*
Temperature	34.50	36.50	35.00	1.27NS
Freezing point	-0.616^{b}	-0.689^{a}	-0.674^{a}	0.00
Ash content (%)	0.91^{a}	0.99^{b}	0.93^{ab}	0.00
Total solid	14.83^{a}	18.16^{c}	15.60^{b}	0.10*
pH	6.91	6.56	6.60	0.35NS
Lactic acid (%)	0.16	0.21	0.19	0.02NS
Milk yield (kg)	2.00^{a}	3.20^{b}	2.90^{b}	0.03*

Means along the same row having the same superscripts are not significantly different from each other (p>0.05)

The milk quality and quantity of the experimental animals are presented in Table 6. The results revealed a fat content of 7.95% (B), 5.78% (C) and 5.35% (A). The highest solids not fat content was noted in the Date seed meal based diets (B and C). The protein lactose, ash and total solids followed similar trend. Additionally, the milk yield per day was 3.20 kg (B), 2.90 kg (C) and 2.0 kg (A, control).

The crude protein content of the Date seed meal fell within the value reported by Sadiq *et al.* (2013). The ether extract was 4.5% which agreed with the reports of Sadiq *et al.* (2013). The crude fibre and ash contents were in agreement with the value reported by Sadiq *et al.* (2013).

The dry matter intake was highest for the Date seed meal based diet compared to the control diet. The result was consistent with the report of Youns *et al.* (1981) who observed no effect of Date seed pits on the feed intake of Awassi lambs. Conversely, the ether extract intake was noted to be greatest for diet C>B>A in that order. The highest ether

extract intake noted for Date seed meal based diet could be probably due to its rich content in diets B and C. The crude fibre and crude protein intake were similar across the diets. The ash intake showed no particular trend as observed in the proximate composition of the diets.

The dry matter digestibility (DMD) reported in this study was contrary to the finding of Younis *et al*. (1981) who noted no effect of Date pits on in-vivo dry matter digestibility. However, the results of crude protein digestibility, ether extract digestibility and crude fibre digestibility reported herein were similar to the report of Al-Owaimer *et al*. (2011).

The highest crude Protein content of the milk was recorded for the Date seed meal compared with the control diet (A). The result was higher than the result of Bosworth and Slyke (2009) for goat. The fat content was greater for the Date seed meal based diet compared to the Control diet (A).This could be presumably be due to better utilization of the fibre content of Date seed meal. Additionally, the result reported herein was greater than the result of Bosworth and Slyke (2009). The solids not fat was highest for Diet B>C>A in that order. The lactose content and ash content were highest for the Date seed meal based diet. The results was consistent with the report of Belewu *et al*. (2010) who fed Beewax residue meal to goat . The total solids content followed the same trend as the Soilds not fat content. The result of this study was not consistent with the work of Bosworth and Slyke (2009). Diet B recorded the highest average milk yield followed by Diet C and the least was Diet A.

Conclusion and Implication

The inclusion of Date seed meal in the diet of goat resulted in improved dry matter intake and ether extract intake. The digestibility coefficient of all nutrient evaluated was better than the control. An interesting consequence of the inclusion of Date seed meal in the diet of goat showed better utilization with enhanced milk quantity and quality. However, higher inclusion of the seed meal should be tested in the future. The inclusion of Date seed meal in the diet of lactating goat should be encouraged among dairy farmers.

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