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Impact Assessment of Using Mango Seed Kernel on Milk Yield and Fatty Acids Profile in Ewes' Diets.

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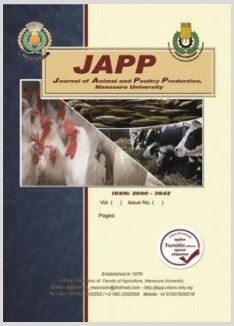

ABSTRACT

The aim of study to estimate the effect of adding different levels of Mango seeds kernel (MSK) to animal diets on milk production and composition and lambs growth. Twenty ewes were chosen randomly and divided into groups (5 in each) to fed four diets during feeding trial, the first diet without MSK (C) , the second (R1) contain 5% MSK, the third (R2) contain 10% and the last one(R3) contain 20% MSK. The results showed that the lambs from mothers fed R2 resulted in a significant increase in weaning weight, growth, and daily growth rate compared to the control. On the other hand, ewes fed R2 recorded the highest actual milk, and 4% FCM yield compared to the other experimental diets and highest feed conversion and feed efficiency Fatty acids profile showed that values of saturated fatty acids decreased in R2 by 4.79% compared to control diet while the unsaturated fatty acids in R2 appeared to increase by 7.7% compared to control diet. There were no significant differences in blood measurements among experimental diets, except for cholesterol concentration, the lowest significant concentration was found when feeding in the diets R2 and R3. Therefore, it can be recommended to include the MSK in ewe's diet at a rate of 10%, with the possibility of increasing the rate to 20% without negatively affecting on the animal's health and economic benefit from it.

***Keywords*:** Mango seeds, milk yield, saturated fatty acids and economic efficiency, ewes

INTRODUCTION

The increase in feed prices and the scarcity of grains and protein sources supplements (e.g., corn grains and soybean meal) in recent years found to be an important constrains hampering dairy and meat production sector in Egypt. Consequently, it had encouraged scientists to find an alternative energy and protein sources to be replacing the more expensive ingredients. The agro-industrial by-products, such as mango seed kernel (MSK), had been identified as an important and inexpensive source of high-quality feed for ruminants (Diarra and Usman 2008; Soomro *et al.*, 2013; Oluremi and Musa 2004; and Riad *et al.*, 2022). So, it can take place in feed formulation to reduce the production cost. MSK can be priced based on protein and energy in comparing the price of soybean meal and corn as standards for both nutrients (Diarra, 2014 and Farag *et al.*, 2022). Mango (*Mangifera indica L., Anacardiaceae*) is the most important fruits in the world. It has the second position as a tropical crop and produced annually by 42 million tons (FAO, 2015). In Egypt, the yield of mango nearly recorded four million tons in year (Abdalla *et al.*, 2007), About 20–60% of the mango fruit contain seed kernel and it had natural antioxidants (Sogi *et al.*, 2013 and Jahurul *et al.*, 2015), Meantime the kernel is presents about 45 to 75% of mango seed (Maisuthisakul and Gordon, 2009), This means between four and eighteen million tons of mango kernel per year in the world (FAO, 2015). Further, kernels have anti-inflammatory, anti-obesity, anti-tyrosinase and hepato-protective effects (Kobayashi *et al.*, 2013). In general, MSK could be consider a nutritional promising seed because it have high levels of carbohydrate (77%), moderate level of protein (6–13%) and fat (11%) on a dry weight basis, and it is a good source of antioxidant and vitamins like vitamins C, E and A and minerals like Ca, k, Mg (Fowomola, 2010; Diarra *et al.*, 2011; Liu *et al.*, 2013 and Diarra, 2014). The protein of MSK has a good essential amino acid profile, especially lysine and methionine (Diarra *et al.*, 2011and Hassan *et al.*, 2013). It is containing ~17MJ/kg DM of gross energy (Sruamsiri and Silman, 2009). MSK has a good source of stearic and linoleic acids (Diarra, 2014). So, The aim of this study was to evaluate the feeding value different levels of mango seed kernel in concentrate fed mixture in order to optimizing its use in lactating ewes feeding.

MATERIALS AND METHODS

This experiment was carried out at El-Noubaria Research Station, Animal Production Research Institute (APRI), Egypt. Seeds of mango were collected from factories of juice (Kaha) after that it air dried then cut seeds to get kernel. The kernel were socked for three days in water then it sunny dried, ground in mills and stored in air tight containers. Afterword, chemical analyses and its contribution to the sheep diet were done. Four concentrate feed mixtures (CFM's) were formulated with using Mango Seed Kernel (MSK) as follow: (1) CFM without MSK (control diet), (2) CFM $_{(5)}$ with 5% MSK, (3) CFM $_{(10)}$ with 10% MSK and (4) CFM $_{(20)}$ with 20% MSK. Formulation of the tested CFM's are presented in Table (1).

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Table 1. Feed ingredients (%) of experimental CFM's (on DM basis).

Feed ingredients, %	MSK levels (%)			
	CFM	CFM(5)	CFM (10)	CFM (20)
Yellow corn	39	35	33	24
Soybean meal	10	10	10	10
Wheat bran	25	23	19	18
Undecorticated cotton seed meal	17	18	19	19
Mango seed kernel	-	5	10	20
Molasses	5	5	5	5
Limestone	2	2	2	2
Salt	1.5	1.5	1.5	1.5
Mineral premix	0.5	0.5	0.5	0.5

Twenty late pregnant Barki ewes were used in the feeding experiment. Ewes were randomly divided into four groups (5 in each) and fed experimental rations R1, R2, R3 and R4, respectively according to live body weight (41.5Kg) and feeding requirements were according to NRC (1994). Experimental rations contained concentrate feed mixture, mango seed kernel, corn silage and rice straw. Ewes and lambs were weighed directly after at 15, 30, 45 and 60 days from the birth. The lambs were separated from their dams after the second meal till the next day. Lambs were weighed before and after suckling, then ewes were hand milking and milk production was recorded. Milk components were analyzed according to Ling (1963), lactose was calculated by the difference. Fat corrected milk (FCM 4 %) was calculated according to Marrogenis and Papachristoforou (1988):

$$M^* (0.411+0.147^* \text{ fat \%})$$

Where M was Milk production in Kg

MSK and Milk fat separated for fatty acids analysis according to luna *et al.* (2005). Fatty acids were methylated according to park *et al.* (2002).

Economic efficiency was calculated as price of daily milk yield (L.E) / daily feed cost. The prices during year of 2023 were as follows; Rice straw =1000 L.E/ton, corn silage =1500 L.E/ton, CFM (control) =15450L.E/ton, CFM containing 5% MSK (2) =15170L.E/ton, CFM containing 10% MSK (3) =14610 L.E/ton, CFM containing 20% MSK (4) =13280 L.E/ton.

Blood samples were collected from jugular vein of ewes before morning feeding. Then centrifuged to separate blood serum and stored at -18°C. Chemical parameters were determined using commercial kits. Serum glucose determine according to Trinder (1969) while determine of total proteins (TP) were done according to Henry and Todd (1974), albumin according to Doumas *et al.* (1971), urea according to Berthelot (1959), and cholesterol was determind according to Tietz (1986). On the other hand, liver function according to Reitman and Frankel (1957).

Statistical analysis

Data of milk production, milk composition and blood parameters were analyzed according to SAS (2011) for PC. The following model:

$$Yijkl = \mu + Ti + a\,(T)\,IJ + WK + Eijkl$$

while significant differences were separated using Duncan (1955).

RESULTS AND DISCUSSION

Chemical composition:

Proximate analysis of MSK, CFM's, corn silage and rice straw were presented in Table .2. Results appeared that MSK was better is good feed with protein, fiber and fat being the main components. Diarra (2014) showed that MSK contains moderate quantities from proteins (6–10%), which considered being sufficient to meet the requirement of most ruminants (Fowomola, 2010). Ether extract (EE) content was increased by increasing the amount of MSK in the CFM's. This could be resulted from their moderate contents in MSK compared with corn as corn had less EE content than that of MSK (4.30 vs. 9.04%). While, value of ash being 1.40 and 2.69 for corn and MSK, respectively (Omer *et al.*, 2019). Okoruwa *et al.* (2015) showed that proximate analysis of MSK was 0.89% CF, 5.90% CP, 5.46% EE, 85.50% NFE and 2.25% ash. Meantime, Farag et al. (2022) reported that MSK contain 128 g/kg of EE and 70 g/kg of CP. In this study, it could be noticed the proximate that analysis of MSK reported some differences from many authors' found, which may attributable to the mango kind, environment, and methods of processing (Farag *et al.*, 2022). The total phenolic content of MSK was found to be10.45 %. Total phenolic contents ranged between 44.76 to 112 mg/100 g (Abdalla *et al.*, 2007 and Sogi *et al.*, 2013). Differences in phenolic component may be due to mango cultivars, extraction conditions and different standard equivalents that use. However, Huber *et al.* (2012) showed that mango seed has 4.89 and 6.84% of total phenols component in skin and kernel, respectively. Total tannins of MSK were found to be 6.82%.

Table 2. Chemical composition (%) of MSK**, CFM's, corn silage and rice straw (on DM basis).**

Item	MSK	CFM	CFM(5)	CFM(10)	CFM(20)	CS	RS
Chemical analysis:							
OM	97.04	91.88	91.85	91.93	91.76	88.31	85.12
CP	9.18	15.74	15.77	15.75	15.74	7.98	3.86
CF	2.68	7.86	7.31	7.91	7.67	26.79	38.71
EE	9.04	3.85	4.35	4.51	5.14	2.10	1.56
Ash	2.96	8.12	8.15	8.07	8.24	11.69	14.88
NFE	76.14	64.43	64.42	63.76	63.21	51.44	40.99
Fiber fractions:							
NDF	30.60	34.08	34.29	34.13	34.23	48.94	67.04
ADF	14.12	19.30	19.48	19.72	19.63	30.55	48.51
ADL	4.50	3.07	3.25	3.35	3.40	7.09	11.19
Hemicellulose	16.48	14.78	14.81	14.41	14.60	18.39	18.78
Cellulose	9.62	16.23	16.23	16.37	16.23	23.46	37.32
GE(K cal/Kg DM)	4639	4251	4277	4288	4313	-	-
DE(K cal/Kg DM)	3944	3587	3608	3616	3639	-	-
Phytonutrients							
Total phenols	10.45	-	0.56	1.22	2.49	-	-
Total tannins	6.82	-	0.36	0.73	1.52	-	-

MSK: mango seed kernel; CFM: concentrate feed mixtures; CFM (5): CFM contain 5% MSK.
CFM (10): CFM contain 10% MSK; CFM (20): CFM containg 20% MSK.
CS: corn silage; RS: rice straw. GE (Gross energy) calculated according to Blaxter (1968) each g EE= 9.40, g CP= 5.65 and CF and NFE= 4.15 Kcal Digestible energy (DE) was calculated according to DeBalas et al., (1992), equation was (DE= GE * (0.867-0.0012*ADF)

Profile of essentials amino acids:

The profile of the most important essentials amino acids (EAA) contents of MSK, corn silage and experimental CFM's are shown in Table (3).

Table 3. Profile of the most important essential amino acids (EAA) contents (%) in MSK, corn silage (CS) and experimental concentrate feed mixtures (CFM's).

EAA,%	MSK	CS	CFM	$CFM_{(5)}$	$CFM_{(10)}$	$CFM_{(20)}$
Lysine	3.12	0.16	0.74	0.89	1.05	1.28
Methionine	1.02	0.12	0.29	0.33	0.38	0.43
Isoleucine	3.12	0.11	0.73	0.87	1.02	1.23
Threonine	2.41	0.21	0.96	1.04	1.10	1.24
Arginine	4.28	0.18	1.14	1.37	1.59	1.93
Valine	3.61	0.24	0.82	0.99	1.15	1.42

It was clear that CFM's contained MSK had greater concentrations of EAA compared with the control one. MSK had sufficient amino acids which could partially meet the requirements of domestic animals. Dhingra and Kapoor (1985) had estimated for all the essential amino acids and indicated their availabilities, so essential amino acid index and calculated biological value in MSK were high in MSK has a good essential amino acid profile especially methionine and lysine; this finding was agreed with Fowomola, (2010); Jadhav and Siddiqui, (2010) and Diarra, (2014). Also, Mahmoud (2009) reported that essentials amino acids represented 39.34% of total amino acids which were higher levels than that reported in the FAO (1993).

Lambs performance:

Values of birth and weaning weight, gain and average daily gain of lambs are presented in Table (4). The values of weights for lambs in R2 group (containing 10% MSK) were significantly higher ($P < 0.05$) as compared with the others. The same significant trend was observed with average daily gain for R_2. The results could be consistent with their dams as they had higher milk yield (Table 5). The results were in agreed with finding of Zhang and Corke, (2001); Yahaya *et al.* (2004) and Mohamed *et al.* (2012) they reported that increase of milk production lead to increase in lambs growth.

Table 4. Birth and weaning weight (Kg), gain (Kg)and ADG(g) for lambs of dams fed experimental diets.

Items	Experimental diets			
	C	R1	R2	R3
No. of lambs	5	5	5	5
Birth weight (kg)	3.72 ±0.06	3.79±0.09	3.83 ±0.11	3.80 ±0.08
Weaning weight (kg)	12.10 ± 0.10^{b}	12.36 ± 0.11^{b}	13.11 ± 0.15^{a}	12.64 ± 0.13^{b}
Gain (kg)	8.38 ± 0.03^{c}	8.57 ± 0.05^{c}	9.28 ± 0.11^{a}	8.78 ± 0.08^{b}
ADG (g)	139.67 ± 0.66^{c}	142.87 ± 0.87^{c}	154.70 ± 0.67^{a}	146.33 ± 0.83^{b}

a, b and c: means in the same row with different superscripts are significantly differ (P< 0.05). ADG: average daily gain.

Milk yield and milk composition

As shown in (Table 5) it was noticed that R2 had the highest (P<0.05) milk production and 4% FCM than the other rations followed by R3, while C and R1 were recorded the lowest value. These data were reflected from those of milk composition (%) of ewes fed the experimental rations. The same trend was found for fat, protein, lactose, TS and SNF in milk composition. This increase may be due to increase diet content from DE (digestible energy) and GE (gross energy) for R2. This agreed with the result obtained by Raid et al., (2022) who found the increasing in DE and GE when mango seed was used instead of corn with different levels. Also, R3 had high content of DG and GE more than R2 but the content of phenol led to decrease milk production

The ewes in group fed R2 (10 MSK) had showed the better (P<0.05) feed conversion and feed efficiency compared to those fed on rations contained 5 and 20% MSK. Meantime, the control group was recorded the lower (P<0.05) feed conversion.

Table 5. Daily feed intake, milk yield and its constituents and feed conversion for ewes fed the experimental diets.

Item	Experimental diets			
	C	R1	R2	R3
No. of ewes	5	5	5	5
Weight of ewe(kg)	41.95	42.30	41.90	42.10
CS intake (g/h/d)	471.45	467.40	469.65	464.65
RS intake (g/h/d)	117.85	116.85	117.35	116.10
DMI (g/h/d)	1339.33 ± 10.27	1327.86 ± 8.22	1333.29 ± 12.11	1319.50 ± 8.89
		production (g/h/day)		
Milk yield (g/h/d)	436.40 ± 6.65^{c}	440.50 ± 5.47^{c}	485.70 ± 7.58^{a}	448.90 ± 6.76^{b}
4% FCM(g/h/d)	437.45 ± 6.46^{c}	441.56 ± 4.40^{c}	486.78 ± 5.77^{a}	449.97 ± 7.28^{b}
		Milk composition (%)		
Total solids(g)	16.27 ±0.11	16.37± 0.09	16.94 ± 0.07	16.78 ± 0.09
Solid not fat(g)	11.89 ± 0.08	11.96± 0.07	12.36 ± 0.09	12.28 ± 0.07
Fat	4.38 ± 0.01	4.41 ± 0.02	4.58 ± 0.04	4.50 ± 0.02
Protein	4.54 ± 0.03^{b}	4.57 ± 0.1	4.71 ± 0.03^{a}	4.66 ± 0.04
Lactose	6.62 ± 0.05	6.65 ± 0.04	6.87 ± 0.06	6.83 ± 0.06
Ash	0.73 ± 0.04	0.74 ±0.03	0.78 ±0.03	0.79 ± 0.04
		Feed conversion		
Feed conv-1	3.07 ± 0.03^{a}	3.01 ± 0.02^{a}	2.75 ± 0.02^{c}	2.94 ± 0.01^{b}
Feed conv-2	2.90 ± 0.02^{a}	2.84 ± 0.04^{a}	2.53 ± 0.01^{c}	2.73 ± 0.01^{b}
Feed efficiency-3	0.344 ± 0.06^{bc}	0.352 ± 0.04^{b}	0.395 ± 0.07^{a}	0.366 ± 0.08^{b}

a, b and c: means in the same row with different superscripts are significantly differ (P< 0.05).

CS: corn silage ; RS: rice straw : Feed conv-1= g DMI/ g milk production; Feed conv-2= g DMI/ g 4% FCM; Feed efficiency-3= FCM (4%) g/DMI(g).

Fatty acids (FA) profile:

The profile of the fatty acids (FA) contents of the MSK and of bulk milk fat from lactating ewes are shown in Table (6). The results showed that MSK saturated fatty acid in fat being 44.23% while unsaturated fatty acids being 55.67 %, this increase resulted from increasing polyphenols in MSK were led to depression on number of protozoa (the major producer of hydrogen). The reduction on hydrogen storage may be cause competition among methanogenesis and biohydrogenation; so, tannin supplementation resulted in an increase of unsaturated fatty acids which decreasing stearic acid level and this agreed with the finding of Khiaosa-Ard et

al. (2009). Also, Vasta et al.(2019) found that tannins can reduce the process of biohydrogenation by modifying the microorganisms in rumen community and this led to decrease of stearic acid synthesis. Meantime, ratio of unsaturated fatty acids to saturated fatty acids was 1.26. The ratio showed that mango kernels fat is stable to oxidation as reported by Hemavathy *et al.* (1988) who found that the main saturated fatty acid was stearic acid (35.36%), while oleic acid was the major unsaturated one (45.89%).

Table 6. Fatty acid profiles (%) of the MSK and milk fat of Barki ewes fed the experimental diets during lactating period.

Items		MSK	C	R1	R2	R3
C 4:0	Butric	0.32	1.14	1.10	0.75	0.99
C 6:0	Caproic	0.39	1.56	1.39	1.57	1.62
C8:0	Caprylic	0.55	1.56	1.50	0.88	1.29
Total short – chain		1.26	4.26	3.99	3.20	3.90
C10:0	Capric	0.70	6.91	6.07	6.97	7.78
C 12:0	Lauric	0.72	4.11	3.88	1.24	1.13
C 14:0	Myristic	0.94	12.18	5.74	6.54	5.12
Total medium – chain		2.36	23.20	15.69	14.75	14.03
C 16:0	Palmitic	5.25	23.92	23.93	26.89	25.97
C18:0	Stearic	35.36	14.21	16.16	17.20	18.55
C18:1n 9 cis	Oleic	45.89	30.21	34.44	31.26	31.85
C18:2 n9 cis,11trans	linoleic	8.46	2.61	3.14	2.36	2.59
C18:3 n9,12,15 cis	linolenic	1.32	0.84	0.81	0.78	0.73
Total long- chain		96.28	71.79	78.48	78.49	78.69
Others		0.10	1.75	3.15	2.38	1.84
Total saturated		44.23	65.59	62.45	62.45	59.77
Total unsaturated		55.67	32.66	34.40	35.17	38.39

Meantime, saturated fatty acids in milk fat was ranged between 59.77 – 65.59% when feeding the experimental diets, while unsaturated one was ranged from 32.66 – 38.39%. The change of stearic acid content when the ewes were fed with MS may be due to the high percentage of that acid in MS (Torres-León *et al.*, 2016). Accordingly, MSK fat is more stable than other vegetable fat high in polyunsaturated fatty acids content. These results were confirmed by that work of Abdalla *et al.* (2007) and Nzikou *et al.* (2010). Fatty acids is important nutritional substances in living organisms. Some kinds of fatty acids play an main role in the regulation of physiological and biological functions (Zhao *et al.*, 2007). Akinyemi *et al.* (2015) suggested that MSK has high energy sources and may be utilize as a source of main nutrients in livestock feeds. MSK oil shown to be rich in oleic and stearic acids, this indicates that they are stable to rancidity. The highly content of polyunsaturated fatty acids makes MSK oil is potential source of nutrient. Mas'ud *et al.* (2020) found that high oleic content showed that MSK oil is healthy, while increase content of stearic fatty acid showed that the oil is stable for rancidity. Fat percentage and composition in milk is dependent on balance between the exogenous FA uptake and its transfer to the mammary gland (Salado *et al.* 2004). Zumbado (1999) reported that when unsaturated fat mixed with saturated fat this led to synergistic effect, producing higher apparent metabolize energy level, while increased saturated FA concentration in milk, that may has a negative effect on human health.

Efficiency of milk production and economic evaluation:

Table (7) illustrated the economic efficiency of the experimental rations fed to ewes.

The economic cash return (L.E/h/d) was increased with diets that contain 10% MSK than diet contain 20% MSK, control ration has the lowest efficiency while R_1 has intermediate economic efficiency. This result obtained because MSK was handled at a cheap rate compared to other ingredients. Improvement in economic efficiency for R_2 and R_3 may be related to the increase feed efficiency, as result to positive effect of MSK on milk production. This experiment confirmed that there is a positive relationship between feed and economic efficiency. Both economical and feed efficiency revenues was higher in R_2. Similarly, the feed cost per kilogram 3.5% FCM of goats was lowest in the groups fed 20 and 40% of MS substituted with corn El-Sanafawy *et al.*, (2023). Also, the daily feed cost was nearly similar in all lambs, but feed cost of weight gain decreased ($P < 0.05$) by increasing MS level in diet. (Shehabeldin *et al.*, 2021).

Table 7. Economic efficiency of the experimental diets.

Item	Experimental diets			
	C	R1	R2	R3
Feed intake (g/h/d)				
DMI, g/d	1339.33	1327.86	1333.29	1319.50
Daily feed cost (L.E/ewe)	11.164	11.013	10.738	10.060
Milk yield	436.40	440.50	485.70	448.90
Price of daily milk yield. LE	11.783	11.894	13.114	12.120
Economic return, LE	0.619	0.881	2.376	2.060
Economic efficiency (%)	100	1.080	1.221	1.205
Improvement	-	2.369	15.735	14.218

There was more milk yields price for ewes fed rations contained MSK than that obtained from the control one. Rations contained 10% MSK had the more economic return (2.37) than that of other ration either contained MSK or non-one. These were reflected on the economic efficiency. It could be noticed that the experimental diet containing MSK tended to improve feed efficiency being 2.37, 15.73 and 14.22 for R1, R2 and R3, respectively.

Blood biochemical and serum constituents:

Blood constituents of ewes fed experimental diets are showed in Table (8).

Table 8. Serum blood parameters for ewes fed the experimental diets.

Item	Experimental diets			
	C	R1	R2	R3
Total protein g/dl	6.81 ± 0.04	7.11 ± 0.06	7.28 ±0.07	7.29 ± 0.06
Albuming/dl	4.09 ± 0.09	4.32 ± 0.08	4.44 ± 0.11	4.45 ± 0.08
Globulin g/dl	2.72 ± 0.11	2.79 ± 0.13	2.84 ± 0.10	2.84 ± 0.14
Glucose mg/dl	44. 63 ± 0.33	45. 87 ± 0.27	46. 91 ± 0.22	47.16 ± 0.30
Cholesterol mg/dl	69.63 ± 0.77[a]	64.89 ± 0.61[b]	60.85 ± 0.82[c]	60.21 ± 0.79[c]
Urea, mg/dl	31.16 ± 0.41	30.25 ± 0.28	29.84 ± 0.44	29.98 ± 0.33
AST, u/l	67.51 ± 0.52	65.88 ± 0.50	65.16 ± 0.46	64.95 ± 0.32
ALT, u/l	32.09 ± 0.21	31.94 ± 0.18	31.14 ± 0.16	30.91 ± 0.14

The concentration of cholesterol was decreased ($P<0.05$) incorporated with MSK. Other serum parameters like glucose, total protein, globulin, albumin, ALT, AST, and urea nitrogen were not affected by replacement of MSK in diets. The result was agreement with finding of (Zhang *et al.* 2017 that mango seeds supplementation decreased total cholesterol content. This may be due to presence of flavonoid in MSK and these components that prevent peroxidation of lipid that regulates synthesis of cholesterol. Concentration of AST and ALT were in the normal range. These results showed that feeding diets containing MSK to lactating ewes was not negatively affected kidney or liver functions. Generally, it could showed that using MSK in ewes diets tended to increase serum total protein, albumin, globulin and glucose with decrease urea, AST and ALT.

CONCLUSION

In view of the obtained results, it could be revealed that MSK could be a good source of fat as energy source and can improve animal performance. However, mango seed kernel can be incorporated in the CFM's from 10% up to 20%, so it could partially replace corn grains, wheat bran even undecorticated cotton seed meal as well without reflection on ewes performance. Thus, it could increase economic efficiency and milk component concentrations improvement without any adverse effect on feed intake. So, this could be achieved by inclusion of mango seed kernel in the CFM from 10% up to 20%. Therefore, more researches are needed regarding in dairy ewes rations should be undertaken for long term feeding.

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تقييم تاثيراستخدام نواة بذور المانجو على إنتاج الحليب والأحماض الدهنية فى علائق النعاج.

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الملخص

اجريت هذه الدراسه بهدف تقدير تاثير اضافه مستويات مختلفه من بذور المانجو لعلائق الحيوان على انتاج اللبن والأحماض الدهنية فى تغذيه النعاج الحلابه و معدل نمو الحملان ، حيث غذيت النعاج (خمسه فى كل معامله) على اربع علائق، الاولى خاليه من البذرة و الثانيه احتوت على 5% و الثالثه 10% و الاخيرة 20% من بذرة المانجو و قد اظهرت النتائج ان هناك زياده معنويه فى وزن الفطام ومعدل النمو للحملان نتاج الامهات المغذاة على العليقه الثالثه مقارنه بالكنترول وباقى العلائق الاخرى. واظهرت النعاج المغذاه على العليقه المحتويه على 10% بذرة أعلى انتاجيه فى اللبن واللبن المعدل لنسبه الدهن 4% عن باقى النعاج بالاضافه الى إرتفاع معدل التحويل الغذائى والكفاءه الغذائيه فى حين كانت أقلهم إنتاجيه نعاج مجموعه الكنترول. وكان هناك انخفاض فى نسبه الاحماض الدهنيه المشبعه نحو 4,79 % فى عليقه10% بينما غير المشبع زادت بقدار 7,7% فى عليقه ال10% بذرة مقارنتا بالكنترول . لم يكن هناك اى فروق معنويه فى قياسات الدم فيما بين العلائق التجريبيه عدا تركيز الكوليسترول والذى بات واضحا ارتفاعه معنويا فى العليقه الكنترول عن باقى العلائق وتلاها العليقه ذات ال 5% بذرة واقل تركيز معنويا وجد فى عليقتى ال 10 و20% بذرة وبذا فادراج بذرة المانجو فى علائق النعاج لم يكن له اى تاثير سلبى على صحه النعاج خاصه على وظائف الكبد والكلى. وعليه يمكن التوصيه بادراج بذرة المانجو فى العلائق المتكامله للنعاج بنسبه 10% مع امكانيه زيادة النسبه الى 20% بدون التاثير السلبى على صحه الحيوان والاستفادة الاقتصاديه منها