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INFLUENCE OF DIETARY MONENSIN AND LASALOCID ON AGE AND WEIGHT OF BARKI RAM- AND EWE-LAMBS AT PUBERTY

(With 8 Tables and One Figure)

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تأثير اضافة المونننزين واللاسالوسيد الى الغذاء على عمر ووزن ذكور وإناث الحملان البرقىعند البلوغ

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أستخدم عدد ١٨ ذكر و١٥ أنثى من الحملان البرقية عند الفطام فى تجربتين لتقييم ومقارنة تأثير المونننزين واللاسالوسيد على كل من معدل النمو والتخمر فى الكرش و كفاءة الأستفاده من الغذاء وكذلك عمر ووزن البلوغ. لذلك تم تقسيم الذكور (فى التجربة الأولى) والإناث (فى التجربة الثانية) عشوائيا الى ثلاثة مجموعات متساوية وهى المجموعة الضابطة والتى غذيت على غذاء بدون أضافه ثم مجموعتين للأيونوفورز والتى غذيت على غذاء العليقه الضابطة مضافا لأحداها ١٧ مليجرام مونـنزين والأخرى١٧ مليجرام لاسا لوسيد/ رأس / يوميا على الترتيب • وفى التجربتين وجد أنه تركيز مجموعة الأحماض الطيارة ودرجة الحموضة وكذلك تركيز حمض البيوتريك لم يتأثر معنويا بالمعاملات المختلفه• فى حين ان نسبة الأسيتات : البروبيونات قد قلت معنويا بإضافة الأيونوفورز فان البروبيونات قد زادت بالأضافه بالمقارنة بالمجموعة الضابطة• ولكن عند المقارنة بالمجموعة الضابطة فأن مجموعة المونننزين كانت أكثر كفاءة فى زيادة نسبة البروبيونات وتقليل نسبة الأسيتات : البروبيونات• ومن ناحية اخرى بينما كانت الحملان المغذاة على المونننزين بها نسبه أقل من الآمونيا بالكرش مقارنة بالمجموعة الضابطة فان الحملان المغذاة على اللاسولا سيد بها أعلى تركيز فى المجموعات الثلاثة • أيضا فى التجربتين كان معدل الزيادة اليومية فى الجسم وكذلك كفاءة الأستفاده من الغذاء أعلى فى المجموعتين المغذاة بالأيونوفورز عن تلك المغذاة فى العليقة الضابطة • وقد وجد أن الذكور (فى التجربة الأولى) المغذاة على المونننزين او اللاسالوسيد بها أعلى زيادة فى محيط الصقن ووصلت الى عمر البلوغ فى مدة ٥٠ ، ٣٧ يوما على الترتيب مبكرا عن المجموعة الضابطة • فى حين أن إناث الحملان (فى المجموعة الثانية) التى غذيت على المونـنزين او اللاسالوسيد وصلت عمر البلوغ مبكرا بمقدار ٣٥,٤ ، ١٣,٤ يوما على الترتيب عن المجموعة الضابطة•بالرغم من أن عمر البلوغ فى إناث الحملان المغذاة على المونـنزين أقل معنويا عن تلك المغذاة باللاسالوسيد• وقد وجد أن مستوى هرمون البرجيستيرون عند البلـوغ أعلى معنويا فى مجموعة المونـنزين عن مجموعة اللاسا لوسيد والمجموعة الضابطة • ومن ناحية اخرى كان الوزن عند البلوغ فى مجموعة

المونتزين أقل معنويا فى التجربتين (٣٣٨ كجم للذكور و ٢٧,٢ كجم للإناث) عن المجموعة الضابطة (٣٤,٩٠ ، ٢٩,٢ كجم على الترتيب).

SUMMARY

A number of 18 male and 15 female weaned Barki lambs were used in two experiments to evaluate the comparative effect of dietary monensin or lasalocid on growth rate, rumen fermentation pattern, feed efficiency as well as age and weight at puberty. Male lambs (experiment 1) and female lambs (experiment 2) were randomly allotted to three equal groups: a control one which was fed on a non supplemented basal diet while, the other two ionophore treated groups were fed on the basal diet supplemented with 17 mg of monensin or lasalocid /head/ day, respectively. In both experiments, it was found that, total Volatile Fatty Acids (VFA), pH and butyrate cocentrations were not significantly affected by treatments. While, acetate(C_2): propionate (C_3) ratios were significantly ($P<0.05$) decreased by both additives, however, propionate was significantly ($P<0.05$) increased. Compared with the control group, monensin appeared to be more effective than lasalocid in increasing ($P<0.05$) propionate and reducing C_2:C_3 ratio ($P<0.05$) and acetate levels. Compared to the control group, rumen ammonia level was lower ($P<0.05$) in lambs receiving monensin than those supplemented with lasalocid. In both experiments, Average Daily Gain(ADG) was higher ($P<0.05$) and feed efficiency was improved ($p<0.05$) by the ionophore feeding. Ram lambs (exp. 1) fed on either monensin or lasalocid had a higher ($P<0.05$) net increase in scrotal circumference, besides that reached puberty earlier ($p<0.05$) than those of the control group by about 50 and 37 days.The same was recorded by ewe lambs (experiment 2) as they reached puberty earlier the control group ($P<0.05$) by 35.4 and 13.4 days for monensin and lasolacid respectively, with the superiority of monensin ($P< 0.08$). Progesterone concentration at puberty was significantly ($p<0.05$) higher in monensin compared with lasalocid and control groups. On the other hand, monensin but not lasalocid decreased weight at puberty of both sexes than control.

Key words: *Barki sheep - Puberty - Food additives*

INTRODUCTION

Barki sheep is one of the main local breeds that are raised mostly under unfavorable management and environmental conditions including less

availability and seasonal fluctuations in feed resources. Such conditions affect their productive and reproductive performance in the form of slow growth rate, delayed puberty and maturity as well as low fecundity (Aboul-Ela and Aboul-Naga, 1987). Early attainment of puberty is considered as an important managemental goal in improving sheep production. It is well known that, puberty occurs as the summation of a series of progressive maturational changes to the central reproductive neuroendocrine axis (Land, 1978). However, the factors controlling onset of puberty are complex and interrelated, the most significant are genotype (Land, 1978), body mass and maturity (Bronson and Manning, 1991), plane of nutrition (Foster and Olster, 1985) and the ambient photoperiod (Kinder et al., 1987).

From the practical stand point, nutrition commands the greatest attention because livestock producers can alter nutrition of extensively produced flocks, whereas alteration of photoperiod or temperature can only be accomplished in intensive management situation (Dunn and Moss, 1992). During the last decades, a number of feed additives has been discovered that could hasten the onset of sexual maturity and increase growth rate in ruminants. One of such additives is carboxylic polyether ionophores, which includes monensin and lasalocid. It was found that, ionophores induce early onset of puberty (McCartor et al., 1979) through enhancing ovarian and testicular function in both heifers and bulls (Bushmich et al., 1980 and Neuendorff et al., 1985) as well as increasing LH release from the pituitary (Randel et al., 1982 and Rutter et al., 1991). The mode of action for ionophores has been attributed, in part to, a shift in the ruminal microbial population that lead to a shift in the pattern of volatile fatty acids towards more propionate and subsequent reduction in methane production (Warner and Douglas, 1984).

Little informations on the efficiency of such ionophores had been reported in sheep and none was performed in local sheep breeds. Therefore, the main objectives of this study was to evaluate the comparative effect of dietary monensin and lasalocid on growth rate, rumen fermentation pattern, feed efficiency as well as age and weight in both Barki ram and ewe lambs at puberty.

MATERIALS and METHODS

Experiment 1:

To determine the effect of dietary monensin and lasalocid on growth rate and age of Barki ram lambs at puberty, eighteen male lambs from Animal Reproduction Research Institute (ARRI) flock were used. The animals were weaned at about 65 days of age (mean body weight 13.69 kg) and were

randomly allotted to three groups with three pens of 6 lambs/each (the lambs were allotted to achieve approximately equal weights in each pen), from weaning to about two weeks postpuberal. The three groups were as follows: (Control) group was fed on a non supplemented basal diet, (Monensin) group in which the animals were fed on the basal diet supplemented with 17mg of monensin sodium*/head/day and (Lasalocid) group was fed on the basal diet supplemented with 17 mg of Lasolacid sodium** /head/day. The basal diet were consisted of a concentrate mixture plus berseem hay. The concentrate mixture composed of 14.49% yellow corn, 29.12% barley, 9.77% soybean meal, 4.85% sunflower meal, 14.56% wheat bran, 9.74% rice bran, 9.71% rice hull, 4.85% molasses, 1.94% limestone and 0.97% common salt. Chemical analysis of the basal diet is shown in Table (1). Animals of all the groups were fed fixed amount of the concentrate according to the age along the experiment, while Berseem was provided ad-lib. Refusals were collected and weighed once a week. Feeding was adjusted every other week according to NRC (1985) to cover the requirement at the corresponding age. Rumen samples were collected at the120 day of the experiment from all lambs (4 hrs post-jeeding) by using a vacuum pump and esophageal hose, to determine pH, ammonia concentration as well as total and relative proportions of volatile fatty acids (VFA). Rumen pH was measured with Cole-Parmer pH meter (USA) within 1 minute of sampling. Five ml of rumen fluid that had been filtered through double layer of cheese cloth were placed in a centrifuge tube. One ml of 25% metaphosphoric acid was added and mixed, and the samples were allowed to stand for 30 minutes. After centrifugation at 200 xg for 15 minutes, 1 ul of the supernatant was injected into a gas chromatography (Hewlett Packard 5890) for separation of VFA according to Erwin et al. (1961). The remainder supernatant was analyzed for ammonia concentrations by the iodophenol procedures of Chaney and Marbach (1982).

Table 1: Chemical*composition of the basal diet (on dry basis).

Item	Concentrate mixture	Berseem hay
Dry matter%	91.70	85.20
Crude protein%	16.12	16.00
Ether extract%	3.70	2.80
Crude fiber%	10.50	24.10
TDN** (estimated)	77.00	60.00

* According to AOAC (1980). **Total Digestible Nutrient

Lambs weights were recorded at the start of the experiment and then at 30 days interval until the end of the experiment after 27-28 weeks. Average daily gain (ADG) and feed efficiency rate (dry matter intake/gain) were recorded. Meanwhile, scrotal circumference was also measured for lambs of all groups at 30 days interval . Puberty was defined as production of $50X10^6$ sperm cells per ejaculate with at least 10% motility obtained by electroejaculator. From the time that the oldest rams reached 5 months of age until reaching 7 months, the rams were ejaculated at 28 days interval, after that and until all lambs had reached puberty, ejaculations were collected every two weeks.

Experiment 2:

To study the influence of monensin and lasalocid on growth rate and age in female Barki lambs at puberty, 15 of ewe lambs from ARRI flock were used after weaning (about 65 days old and 12.47 kg weight). Lambs were randomly assigned into control , monensin and lasalocid groups containing 5 ewe lambs/group from weaning until puberty. The ingredients and nutrient composition of the used diets, the inclusion rate of both monensin and lasalocid as well as the nutritional management were similar to that in experiment (1).Ruminal fluid samples were collected from all ewe lambs at the day 140 of the experiment. The tested parameters as well as the methods used for sampling and analysis were similar to that in experiment (1). Ewe lambs weights were recorded at the start of the experiment and at 28 day intervals thereafter. ADG and feed efficiency rate were also recorded. When the oldest ewe reached 5 months, ewes were observed twice weekly for behavioral estrus using a vasectomized ram. In the same time, serum samples were taken for progesterone twice weekly until puberty. Serum progesterone hormone was analyzed by RIA technique according to Dobson (1983). Puberty was determined as the first behavioral estrus associated with elevated serum progesterone (> 1.0 ng/ml) at least in two successive samples.

The data of the two experiments were statistically analyzed according to Sendecor and Cochran (1982).

* Monensin premix (10%, supplied by Elli Lilly Co.)

** Avatec premix (15% supplied by Hoffman La Roche Co.)

RESULTS

Experiment 1:

Table 2: Ruminal pH, ammonia and volatile fatty acids (VFA) concentrations in Barki male lambs supplemented with dietary monensin and lasalocid.

Item	Control	Monensin	Lasalocid
pH	5.06±0.22[a]	5.17±0.06[a]	5.12±0.11[a]
Total VFA (mmol/L)	89.43±0.69[a]	90.15±1.49[a]	88.15±0.49[a]
Acetic acid (C_2 mmol/L)	49.04±0.29[a]	43.77±0.98[b]	44.44±0.71[b]
Propionic acid (C_3, mmol/L)	30.48±0.39[a]	38.74±0.39[b]	33.52±0.40[c]
C_2:C_3	1.57±0.003[a]	1.11±0.018[b]	1.32±0.017[c]
Butyric acid (mmol/L)	8.47±0.15[a]	8.46±0.11[a]	8.13±0.19[a]
Ammonia (mg/dL)	37.17±0.60[a]	28.78±0.16[b]	40.04±0.57[c]

Mean±SE (n=6) Row means with common superscript are not significant at ($P<0.05$).

Ruminal fermentation pattern of Barki male lambs at the day 120 of experiment are presented in table 2. It was found that, ruminal pH was not significantly affected by ionophore supplementation. Total VFA were not significantly affected by treatment. While C_2:C_3 ratios were significantly ($P<0.05$) lowered by both additives, propionate was increased ($P<0.05$) by them. However, When compared with control, monensin (17 mg /head/ day) appeared to be more effective than lasalocid (17 mg/head/ day) in increasing ($P<0.05$) propionate (27.10 Vs 9.97 % over control, respectively) and reducing ($P<0.05$) C_2:C_3 ratio (29.20 Vs 15.92% over control, respectively) and acetate (10.69 Vs 9.30 % over control, respectively). Butyrate concentration was not significantly affected by means of treatment. Regarding to ammonia pool, lambs receiving monensin had ammonia levels lower ($P<0.05$) than control, while lambs receiving lasalocid recorded the highest ($P<0.05$) value for ammonia concentrations.

Table 3 presented feed intake, average daily gain (ADG), feed efficiency and scrotal circumference in Barki male lambs from weaning up to 256 days old. It was found that dry matter intake during this period was not significantly differ between the treatment means. However, ADG was higher ($P<0.05$) by ionophore feeding than control. Monensin fed-lambs tended to gain ($P<0.06$) more weight than the lasalocid group resulted in a higher final weight (40.30 Vs 36.67 kg). Meanwhile, feed efficiency rate was significantly ($P<0.05$) improved by ionophore feeding, where it was about 26.72% for monensin and 23.50% for lasalocid compared to the control. On the other

hand, addition of monensin and lasalocid lead to a higher (P<0.05) net increase in scrotal circumference of male lambs.

Table 3: Feed intake, average daily gain (ADG), feed efficiency and scrotal circumference in Barki ram lambs offered monensin or lasalocid in their diet.

Item	Control	Monensin	Lasalocid
Initial weight (Kg)	13.47±0.33^{a}	13.80±0.31^{a}	13.80±0.17^{a}
Final weight (Kg)*	31.00±2.16^{a}	40.30±2.42^{b}	36.67±1.67^{ab}
ADG (g)	89.70±8.82^{a}	133.55±13.22^{b}	119.77±6.53^{b}
Dry matter intake (Kg)**	1.17±0.044^{a}	1.23±0.036^{a}	1.24±0.036^{a}
Feed efficiency rate	13.36±0.83^{a}	9.79±1.12^{b}	10.22±0.36^{b}
Scrotal circumference (Cm):			
Initial	8.00±0.25^{a}	7.60±0.199^{a}	7.83±0.307^{a}
Final	12.40±0.41^{a}	17.67±1.69^{b}	15.80±1.22^{ab}
Net increase	4.83±0.40^{a}	8.17±1.22^{b}	9.30±1.10^{b}

Mean±SE (n=6).

* Control and lasalocid means differ at (P<0.06).

**Roughage: concentrate ratio was around 1:1.

Row means with common superscript are not significant at (P<0.05).

Table 4: Age, weight and scrotal circumference at puberty of Barki ram lambs fed on diets supplemented with monensin and lasalocid.

Item	Control	Monensin	Lasalocid	Probability
Age (day)	282.0±16.33^{a}	232.8±7.40^{b}	245.0±9.57^{b}	P<0.05
Weight (Kg)	34.90±0.52^{a}	33.80±0.31^{b}	34.42±0.20ab	P<0.1
Scrotal circumference (cm)	16.10±0.49	15.80±0.35	16.08±0.24	ns*

Mean±SE (n=6) * ns = non significant

Row means with common superscript are not significant

Table 4 presented age, weight and scrotal circumference of male lambs received monensin or lasalocid supplements. It is clear that, addition of either supplements significantly (P<0.05) enhance age of puberty. Male lambs fed on monensin or lasalocid reached age of puberty earlier than those of the control diet by 50 and 37 days, respectively. However, weight at puberty tend to be lower (P<0.1) in monensin group compared with control while, scrotal circumference at puberty was not affected by means of treatment.

Experiment 2:

Table 5: Ruminal pH, ammonia and volatile fatty acids (VFA) concentrations in Barki ewe lambs supplemented with dietary monensin and lasalocid.

Item	Control	Monensin	Lasalocid
pH	5.27±0.01[a]	5.13±0.07[a]	5.28±0.08[a]
Total VFA (mmol/L)	87.19±0.73[a]	87.20±0.74[a]	85.94±1.29[a]
Acetic acid (C_2, mmol/L)	47.66±0.56[a]	41.34±0.64[b]	41.34±0.36[b]
Propionic acid (C_3, mmol/L)	29.88±0.42[a]	37.70±0.55[b]	32.20±1.07[c]
C_2:C_3	1.56±0.025[a]	1.10±0.017[b]	1.30±0.033[c]
Butyric acid (mmol/L)	8.49±0.15[a]	8.33±0.167[a]	8.28±0.159[a]
Ammonia (mg/dL)	36.40±0.51[a]	28.40±0.51[b]	38.80±0.58[c]

Mean±SE (n=5). Row means with common superscript are not significant at ($P<0.05$).

Table 5 presented the rumen fermentation pattern of Barki ewe lambs supplemented with monensin or lasalocid in their diet. In general, pattern of fermentation of ewe lambs were more or less similar to that of ram lambs in respect to the level of significance between different groups.

Table 6: Feed intake, average daily gain (ADG) and feed efficiency in Barki ewe lambs offered monensin and lasalocid in their diet.

Item	Control	Monensin	Lasalocid
Initial weight (Kg)	12.60±0.245[a]	12.40±0.25[a]	12.40±0.26[a]
Final weight (Kg)	29.00±0.73[a]	34.00±1.67[b]	30.00±0.84[a]
ADG (g)	77.22±2.03[a]	109.50±9.37[b]	82.86±1.14[c]
Dry matter intake (Kg)*	1.06±0.179[a]	1.10±0.102[a]	1.034±0.02[a]
Feed efficiency rate	14.40±0.51[a]	10.13±1.06[b]	12.49±0.25[c]

Mean±SE (n=5)

*Roughage: concentrate ratio was around 1:1.

Row means with common superscript are not significant at ($P<0.05$).

Table 6 showed the effect of monensin and lasalocid supplementation on feed intake, ADG and feed efficiency in Barki ewe lambs from weaning up to 256 days old. It is clear that dry matter intake was not significantly affected by ionophore feeding. ADG fulfilled its lowest degree on control group (77.22 g/day, $P<0.05$) followed by lasalocid group (82.86 g/day, $P<0.05$) then reached its highest degree in monensin group (109.5 g/day, $P<0.05$). Meanwhile, feed efficiency took the same trend of ADG, where the

values were 14.40, 12.49 and 10.13 for control, lasalocid and monensin groups, respectively.

Regarding serum progesterone profile, two ways analysis of variance (ANOVA) were performed to study the effect of time of sampling and ionophore supplementation as two main factors and their interaction on serum progesterone in Barki ewes. ANOVA(tables 7) revealed that both factors and their interactions were significant ($p<0.01$). As shown in fig.1 progesterone levels were not significantly ($p<0.05$) differ between the three experimental groups (control, monensin and lasalocid) during the prepuberal period. However, all ewe lambs had single elevation of progesterone concentration between 0.8 and 1.05 ng/ml before the first ovarian function. Meanwhile, monensin-fed ewe lambs had significant ($p<0.05$) higher progesterone levels at puberty than those of the other two groups.

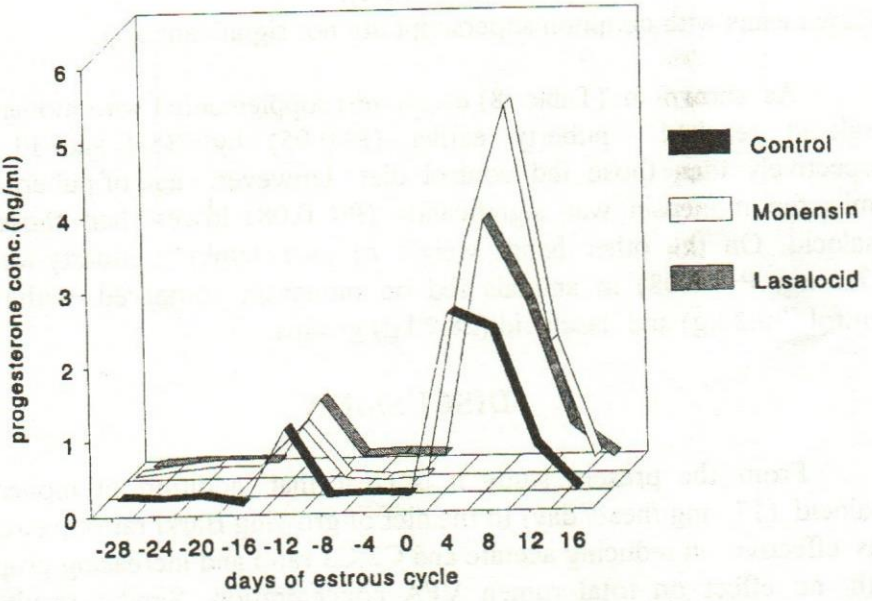

Fig 1: Effect of Monensin and Lasalocid on serum progesterone levels arround puberty in Barki ewes (o=onset of puberty).

Table 7: Analysis of variance (ANOVA)for the effect of time of sampling and ionophore supplementation on progesterone profile in Barki ewe.

Source of variation	df	Mean squares	Probability
Main effect:			
Time	7	23.28	p<0.01
Ionophore	2	12.57	p<0.01
Interaction	14	2.84	p<0.01
Error	96	0.379	

Table 8: Age and weight at puberty of Barki ewe lambs fed on diets supplemented with monensin or lasalocid.

Item	Control	Monensin	Lasalocid	Probability
Age (day)*	252.6±0.81[a]	216.0±10.71[b]	239.2±4.43[b]	P<0.05
Weight (Kg)	29.20±0.778[a]	27.20±0.581[b]	28.70±0.69[ab]	P<0.08

Mean±SE (n=5)

*Monensin and lasalocid differ at (p<0.08).

Row means with common superscript are not significant at p.

As shown in (Table 8) ewe lambs supplemented with monensin and lasalocid reached puberty earlier (P<0.05) by 35.4 and 13.4 days, respectively than those fed control diet. However, age of puberty in ewe lambs fed monensin was significantly (P< 0.08) lower than those fed on lasalocid. On the other hand, weight of ewe lambs at puberty was lower (27.2 kg, P< 0.08) in animals fed on monensin compared with those of control (29.2 kg) and lasalocid (28.7 kg) groups.

DISCUSSION

From the present study it is clear that, addition of monensin or lasalocid (17 mg /head/ day) to the diet of growing Barki ram-or ewe-lambs was effective in reducing acetate and C2:C3 ratio and increasing propionate with no effect on total rumen VFA concentration. Similar results were reported by Ricke et al. (1984) in lambs. However, monensin appear to be more effective than lasalocid in improving rumen fermentation. Moreover, monensin and lasalocid apparently did not behave in a similar manner with regard to ruminal ammonia metabolism, when compared with control, although, monensin decreased rumen ammonia, lasalocid increased it, a matter which confirm what has been reported by Ricke et al. (1984). Probably, as indicated by Warner and Douglas (1984) this may attributed to

either a depressing effect of monensin on overall cell numbers resulting in depression of available proteolytic and deaminative enzymes or direct effect on both protease and deaminase activities. This in turn lead to an increase in the quantity of dietary protein escaping ruminal degradation (by-pass) and would therfore be available for digestion and uptake in the small intestine.

ADG and feed efficiency rate appeared to be improved by either of the two additives in both experiments. Other investigators (Ricke et al., 1984; Funk et al., 1988 and Shetaewi and Ross, 1990) reported the same effects in lambs. This may be attributed to change in molar proportion of VFA toward more propionate and less acetate that lead to increasing the efficiency of converting feed energy in the acid end products available for absorption (Warner and Douglas, 1984). Meanwhile, monensin tend to be more efficient than lasalocid in improving ADG and feed efficiency in ram lambs, this became very clear in ewe lambs. Such variation may be attributed to sex difference in growth rate and reflect the recorded variation in rumen fermentation between both ionophores.

DMI was not affected by means of treatment in both experiments. Same findings were reported by Ricke et al. (1984) and Horton and Stockdale (1981) in lambs. On the contrary, Funk et al. (1988) and Shetaewi and Ross (1990) found an increase in feed intake with ionophore feeding. On the other hand, the present results are not consistent with the decrease in feed intake with ionophores in cattle reported by Berger et al., 1981 and Gutierrej et al., 1982. This differences may be attributed to variations among species, diet and the dose of ionophores.

The recorded higher net increase in scrotal circumference of ram lambs fed on ionophores additives is in line with that found by Neuendorff et al. (1985) in bulls. This may be due to the increase of testis size as a result of the increase in the spermatogenic activity. It is worthy to mention that, the use of monensin or lasalocid lead to an early of puberty ($50X10^6$ sperm cell/ejaculate) in treated Barki ram lambs by approximately 50 and 37 days respectively. This result is in line with Neuendorff et al. (1985) in bulls. Meanwhile, onset of puberty in ewe lambs fed on such ionophores was earlier by 35.4 days (monensin) and 13.4 days (lasalocid) than that of the control. This agreed with Moseley et al (1977), McCartor et al (1979) and Meinert et al (1992) in heifers. These observations indicated that ionophores feed additives may induce early puberty in ram and ewe lambs as a consequence for enhancement of feed efficiency as well as increase body gain. This suggestion was previously reported by many studies (see Robinson, 1990) as growth rate has a great influence on age of puberty.

In the present study, the brief elevation of progesterone concentration preceding the first estrus (progesterone priming) seems essential for the subsequent establishment of normal estrus cycles(Foster and Ryan, 1979) . The recorded higher progesterone levels ($p<0.05$) in monensin-fed ewes at puberty compared with lasalocid and control was previously reported by (Randel et al., 1982) This may be due to an enhancement in luteal development of monensin group ovaries as reported by Bushmich et al., 1980 in prepuberal cow. They also found that, the mean luteal progesterone concentrations per cow and the mean progesterone per corpus luteim were greater in monensin than control.Weight of lambs at puberty in this study was significantly lowered by dietary monensin supplementation in both ram ($P<0.08$) and ewe lambs ($P<0.1$) compared with the control. This may indicate direct effect of monensin on the neuroendocrine axis responsible for attainment of puberty through increasing propionate level. An integral relationship between ruminal VFA production and reproductive hormonal release and/or synthesis was proposed by Mosely et al (1977); Rhodes et al. (1978) and Bushmich et al (1980). Moreover, increased ruminal propionate promote gluconeogensis activity which may hasten the onset of puberty by increasing the energy availability (Randel,1990) and/or by changing the concentrations of metabolic hormones as insulin (Shetaewi and Ross, 1990) and growth hormones (Bassett, 1975). The effect of propionate production may also mediated through changes in concentrations of reproductive hormones such as LH and progesterone (Randel et al., 1982) as found in this experiment, or by testosterone as with (Neuendorff et al., 1985). On the other hand, the effect of monensin on reproduction (especially LH release) could be mediated through direct effect on adenohypophysis and/or indirect effect on the release of GnRH from the hypothalamus. This may be due to the alteration of the intracellular concentrations of calcium ions induced by monensin that may alter several events in LH release such as receptors recycling (Armstrong and Spears, 1988).

From the present study, it could be recommended that, dietary monensin or lasalocid can be used in a rate of 17 mg/head/day at weaning to improve feed efficiency, growth rate as well as enhancing the age of puberty in Barki ram and ewe lambs. Monensin was more effective than lasalocid in improving the above parameters in addition to the lowest body weight at puberty compared to control.

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