Efficacy of different levels of monensin on growth performance of Angora goat kids

BY

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SUMMARY

Eighteen male Angora goats' kids weighting an average of 12.3 Kg were randomly allotted to three group treatments of sex kids each. Goats in all groups were fed concentrate feed mixture (13.8% CP) to cover their maintenance requirements of TDN and CP, while berseem hay (BH) was given as a sole roughage in amounts equivalent to 1% of the animals body weight . Rations were supplemented with monensin at the levels of 0, 20 and 40 mg / head/ day.

The results exhibit that goats fed monensin supplemented rations had lower ($P<0.05$) dry matter intake (DMI) than control diets. Inclusion of monensin significantly ($P<0.05$) increased daily gain of kids than control group. While, increasing the level of moninsen did not have any effect of daily gain. The addition of monensin to the rations of kids improved feed conversion efficiency by 15% on average compared with non-treated control kids, the nutritive values as % TDN showed an increase ($P<0.05$) for animals fed rations containing monensin . Inclusion of monensin significantly ($p<0.05$) increased nitrogen retained. Monensin casued a shift in the proportions of fermentation with little effect on total acids production .Inclusion of monensin in the rations of goats significantly ($P<0.05$) increased total blood protein, albumin, globulin and glucose, while monensin did not have any effect on either haemoglobin or urea-N.

INTRODUCTION

Various feed additives and subcutaneous implants have been successfully used by the feedlot industry to stimulate growth and improve feed utilization. Rumensin has been showed to increase feed efficiency in both sheep and cattle and increases live body gain *(Utley et al., 1976; Mohsen et al.,1981 and Mohsen and Tawfik,1999)*. Rumensin alters rumen fermentation, producing more propionic acid and less acetic acid *(Utley et al., 1976)*. Rumensin decreases rumen ammonia due to protein degredation *(Poos et al., 1979)*.

The aim of the present study was to investigate the effect of feeding monensin on utilization of feeds, performance, some blood parameters and rumen activity of Angora goats.

MATERIALS AND METHODS

Eighteen male Angora goat's kids weighting an average of 12.3Kg and age of seven months were randomly allotted to three similar group treatments of sex kids each, for eighty four days expermintal period.

All animals were fed on berseem *(Trifolium alexandrinum)* hay, (BH) as sole roughage in amounts equivalent to 1% of the animal's body weight supplemented with the concentrate feed mixture (13.8% crude protein). The daily amounts of concentrate feed mixture were adjusted biweekly according to individual changes of the experimental animal's body weight to cover their requirements according to *NRC (1985)*. Daily feed allowances were offered in almost two equal meals at 8.00 a.m. and 4.00 p.m. and fresh water was available at all times. Monensin was mixed at the rate of 0, 20 and 40 mg/head/day for groups 1, 2 and 3 with the concentrate feed mixture. Kids in each treatment group were fed and actual feed intake of each group was recorded daily. The experiment lasted for 84 days. Fasting body weight was individually recorded into successive days, weekly.Thc chemical composition of feeds (Table 1) was determined according to *A.O.A.C. (1984)*.

Table (1): Chemical composition of feeds.

Item	On dry basis (%)						
	Dry matter (%)	Organic matter	Crude protein	Ether extract	Crude fibre	Nitrogen free extract	Ash
Berseem hay	89.10	87.47	13.25	1.96	31.22	41.04	12.53
Concentrte feed mixture*	88.87	91.66	13.80	3.74	15.49	58.63	8.34

* Containes : 35% undecorticated cotton seed meal, 23% yellow maize, 32% wheat bran, 4% rice bran , 3% molasses , 2% limestone and 1% common salt .

Three digestibility trials using three animals from each treatment were carried out at the end of the feeding trial .Each digestibility trial

lasted for seventeen days, where the first ten days for animals adjustments with the metabolic crates and the following seven days to collect the feces and urine.

Rumen liquor samples were obtained 3 hours after the morning feeding at the end of the digestibility trial, using a rubber stomach tube inserted into the rumen via the oesophagus. Rumen liquor was strained through four layers of cheese cloth. Ruminal pH was determined directly using Beckman's pH meter. Total volatile fatty acids' concentration ($VFA's$) were determined by steam distillation as described by *(Warner, 1964)* using Markham micro-distillation apparatus *(Markham, 1942)*. Individual VFA^s were determined according to *(Byers, 1980)*. Ammonia-N was determined using magnesium oxide (Mgo) distillation *(A.O.A.C., 1984)*.

Blood samples were taken from the jugular vein of the same three animals in each group, three hours after the morning feeding. Blood serum was separated whithin one hour and stored frozen at –20 C for determination of total protein, albumin, glucose, urea and haemoglobin as described by *(Marsh et al., 1965)*. Globuline concentration was calculated by difference between the total protein and the albumin concentration.

Data of the present study were statistically analysed using General Linear Model's procedure adapted by *SPSS (1997)* for user's Guide. Duncan multiple range tests were used to test the differences among means *(Duncan, 1955)*.

RESULTS AND DISCUSSION

The averages of daily body weight gain during the whole experimental period (84 days) were 53.6, 58.3 and 57.1g/d, respectivcly for the treated groups (Table 2). Results showed that feeding monensin at the level of 20 and 40 mg/head/day caused a significant ($P<0.05$) increase in daily gain by 8.77 and 6.53% respectively, compared to the non-treated control group. The results of the present study agree with those obtained by many workers. *Utley et al.,(1976)* reported that heifers fed rumensin gained more ($P< 0.05$) than the control group (non-treated). *Bergstrom and Maki (1976)* found that lambs fed monensin gained more than non-treated control. *Mohsen et al., (1981),* also, found that the addition of rumensin to the rations of steers caused an improvement in body weight gain. In the same trend *Mohsen and Tawfik (1999) and Mohsen (2003)* reported that feeding rumensin significantly increased daily gain in lambs.

On the contrary, *Norris et al., (1986)* found a close negative relationship between the concentration of monensin and daily weight change.

Table (2) also, show that daily feed dry matter (DM) intake of kids was decrease significantly (P<0.05) by feeding monensin .While, *Isichei et al., (1977)* found that rumensin did not affect daily feed intake. *Mohsen et al., (1981)* indicated that DMI in steers was not affected by feeding rumensin. Also, *Mohsen and Tawfik (1999) and Mohsen (2003)* reported that rumensin (20 mg) did not have any effect on DMI in lambs.

Table (2) : Feed intake, performance and nutritive value of goats fed experimental rations .

Item	Groups		
	1	2	3
Animal No.	6	6	6
Experimental Period, days	84	84	84
Initial body weight, kg	12.4	12.2	12.3
Final body weight, kg	16.9	17.1	17.1
Total gain, Kg	4.5^{b}	4.9^{a}	4.8^{a}
Average daily gain ,gm	53.6^{b}	58.3^{a}	57.1^{a}
Daily feed dry matter intake, gm			
DMI of body weight, %	4.9	4.5	4.5
Total, gm	613^{a}	554^{b}	549^{b}
Concentrate	362^{a}	342^{b}	336^{b}
Berseem hay	251^{a}	212^{b}	213^{b}
Feed DM/ gain, Kg	11.4^{a}	9.3^{b}	9.6^{b}
Improvement over control,%	—	18.4	15.8
Feed convertion, Kg/Kg gain			
TDN	6.99^{a}	5.92^{b}	6.10^{b}
DCP	0.93^{a}	0.70^{b}	0.74^{b}

Means in the same row with different superscripts are significantly different (p<0.05)

Feed conversion efficiency was improved by 18.4 and 15.8% respectively for the treated groups compared with the control group. These results are in accordance with *Utley et al., (1976)* who observed that adding

rumensin to the ration of heifers improved feed efficiency by 9.6% compared with non-treated control and *Mohsen (2003)* also,reported that rumensin (20 mg/h/d) improved feed conversion by 18.9% compared with control group .

Joyner et al., (1979) reported that inclusion of monensin significantly increased feed conversion in lambs. Also, *Potter et al., (1976)* found 20% improvement in feed efficiency by feeding 200 mg monensin in cattle. Although feed efficiency was not affected by level of monensin compared with untreated control goats, *(Gado, 1997).*

Data in Table (3) showed that monensin did not have any effect on the digestibility of the nutrients in the experimental animals except crude protein and crude fiber. *Dinius and Simpson (1975)* reported that digestion coefficient of protein was improved 6.3% due to feeding monensin. *Laurent et al., (1980)* found that monensin did not affect the digestibilities of organic matter, crude protein and crude fiber. *Muntifering et al., (1981)* also found that monensin had no effect on digestion coefficient of crude protein. The nutritive values as % TDN and DCP showed an increase ($P<0.05$) for animals fed rations containing monensin.

Table (3): Effect of feeding monensin on digestibilities, nutritive value and nitrogen utilization of goats.

Item	Groups		
	1	2	3
Digestibility , %			
Dry matter (DM)	59.62	60.84	61.60
Organic matter (OM)	65.18	67.74	67.92
Crude protein (CP)	62.31^{b}	64.40^{a}	63.77^{a}
Crude fibre (CF)	54.01^{b}	56.66^{a}	57.16^{a}
Ether extract (EE)	80.74	81.48	81.01
Nitrogen free extract(NFE)	73.52	74.92	75.12
Nutritive values, %			
TDN	61.32^{b}	63.64^{a}	63.81^{a}
DCP	6.12^{b}	7.53^{a}	7.72^{a}
Nitrogen, g/day			
Intake	13.32	12.05	11.95
Fecal	5.02	4.29	4.33
Urinary	5.54	4.64	4.36
Nitrogen balance, g/day	2.76^{b}	3.12^{a}	3.26^{a}
Nitrogen balance,% NI	20.72	25.89	27.28

Averages within each row indicated by the different letter are significantly differing at the 5%.

Results in Table (3) also show that nitrogen intake decreased ($P<0.05$) by feeding monensin. Inclusion of monensin significantly ($P<0.05$) increased nitrogen retained. *Byers (1980)* suggested that the primary effect of monensin is to improve dietary nitrogen value. While *Ricke et al., (1984)* found that monensin did not affect absorbed nitrogen.

Data in Table (4) showed that there were no significant differences ($P>0.05$) between all experimental groups for ruminal pH, ammonia-nitrogen (NH3-N) and total volatile fatty acids concentration (TVFA's). Also, results observed that acetic acid concentration was significantly ($P<0.05$) decreased in animals fed monensin. Feeding monensin, significantly ($P<0.05$) increased propionic acid concentration but there were no significant differences between all groups in butyric acid concentration and A/P ratio.

The same results were observed by *Mohsen (1999)* who found that there were no significant differences in pH, TVFA's and NH3-N between all groups of lambs fed different levels of rumensin , he found also an increase ($P<0.05$) in propionic acid concentration and decreased ($P<0.05$) acetic acid concentration in lambs fed rumensin .

Table (4): Effect of feeding different levels of monensin on ruminal pH , VFA's and NH3-N in goats .

Item	Groups		
	1	2	3
pH	6.40	6.51	6.52
NH3-N(mg/100ml)	31.12	31.22	31.30
Total VFAs, (Meq./100ml)	7.06	7.40	7.76
Molar proportion			
Acetic	60.84^{a}	56.62^{b}	57.02^{b}
Propionic	29.62^{b}	33.16^{a}	35.64^{a}
Acetic/propionic ratio	5.76	5.18	5.08
Butyric	2.05	1.71	1.60

Values within each row indicated by the same letter are not significantly at the 5% .

Gado (1997) and Mohsen and Tawfic (1999) reported that there were no significant effects on the total volatile fatty acids concentration in goats and lambs fed rumensin. Also, *Dinius and Simpson (1975); Ushida et al., (1985) and Mohsen and Tawfic (1999)*

found that feeding rumensin resulted in an increase in propionate concentration and a decrease in both butyrate and acetate concentrations. Significantly lower (P<0.05) acetate/propionate ratios were observed in cattle fed monensin *(Harvey et al., 1975).*

Results of blood parameters are presented in Table (5). Data showed that there were no significant differences between all experimental groups for haemoglobin and urea- N concentration.

Table (5): Average values of blood serum constituents of angora kids fed different levels of moninsen.

Item	Groups		
	1	2	3
Total protein, g / 100 ml	6.64[b]	7.12[a]	7.26[a]
Albumin, g / 100 ml	3.34[b]	4.42[a]	4.40[a]
Globuline, g /100 ml	3.10[b]	3.70[a]	3.86[a]
A / G ratio	1.08	1.19	1.14
Urea (mg / 100 ml)	6.01	6.12	5.96
Glucose (mg /100 ml)	54.16[b]	57.02[a]	57.18[a]
Hb (g /100 ml)	12.32	12.46	12.40

Average within each row with different superscripts are different at (p<0.05)

Serum total protein, albumin, globulin and glucose were significantly (P<0.05) increased in groups fed moninsen .*Potter et al., (1976)* reported that monensin slightly increased blood urea nitrogen and significantly (P<0.05) increased plasma glucose in both steers and heifers. *Mohsen (1999)* reported that inclusion of rumensin significantly increased total protein, albumin and glucose concentration in lambs and did not affect on globulin and urea-N concentration.

The increased blood glucose with monensin is probably due to the consequence of increased propionic acid being avaliable for synthesis of glucose.

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الملخص العربي

تأثير استخدام مستويات مختلفة من المونننسن على الاداء الإنتاجي لصغار ماعز الانجورا

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استخدم في هذه الدراسة ثلاثة مجاميع كل مجموعة تحتوى على ستة حملان انجورا (ذكور) متوسط أوزانها ١٢,٣ كجم في تجربة نمو (٨٤ يوم) لدراسة تأثير استخدام المونننسن على الأداء وبعض صفات الدم ونشاط الكرش.

وكانت المجاميع كالتالي:
١- المجموعة الغير معاملة (مجموعة المقارنة).
٢- المجموعة التي أعطيت ٢٠ ملجم مونننسن لكل رأس يومياً.
٣- المجموعة التي أعطيت ٤٠ ملجم مونننسن لكل رأس يومياً.

وتم تغذية الحيوانات في المجاميع الثلاثة على دريس البرسيم + العليقة المركزة (١٣,٨% بروتين كلى) حسب الاحتياجات.

وأوضحت النتائج:

١- أن استخدام المونننسن سبب زيادة جوهرية في معدل الزيادة اليومية في وزن الحملان بمعدل ٨,٧٧ ، ٦,٥٣% مقارنة بمجموعة المقارنة.

٢- أدت أضافة المونننسن الى نقص كمية المادة الجافة المستهلكة معنويا مقارنة بمجموعة المقارنة.

٣- نقص تركيز حمض الخليك معنوياً بينما زاد تركيز حمض البروبيونيك معنوياً عندما أعطى المونننسن ولم يكن هناك أي اختلافات معنوية في تركيز حمض البيوتريك بين المجموعات المختبرة . ولم يظهر أي اختلافات معنوية بين صفات الكرش المختلفة (الـ pH والامونيا والأحماض الدهنية الطيارة)

٤- ازداد معنويا تركيز كل من البروتين الكلى والالبيومين والجلوبيولين والجلوكوز بالدم في المجموعات المعاملة عن مجموعة الكنترول ولم يظهر أي اختلافات معنوية بالنسبة للهيموجلوبين واليوريا بين المجاميع المختلفة .