# INFLUENCE OF FEEDING RUMENSIN AND IMPLANTING RALGRO ON PERFORMANCE AND RUMEN ACTIVITY OF LAMBS

**Mohsen, M. K.**
Department of Animal Production, Faculty of Agriculture,
Kafr El-Sheikh, Tanta University, Egypt

## SUMMARY

Four groups, each six growing male Rahmany lambs with an initial body weight 19.0 kg were used in a 110 day's growth experiment to study the effect of feeding rumens in with or without ralgro implants on performance, and some blood parameters. The four treatment groups were: non-treated control; 20mg rumensin; 12 mg ralgro and 20 mg rumensin + 12 mg ralgro. Animals in all groups were fed on 1% of body weight berseem hay supplemented with the concentrate mixture according to NRC (1985) recommendation. Results showed that feeding rumensin alone or in combination with ralgro implants of ralgro implants alone cause a significant increase in daily gain, i.e 16.7, 25.3 and 19.2% respectively, compared with the non-treated control group. Dry matter intakes were nearly similar in all experimental groups. The molar proportion of both acetic and butyric acids decreased ($p<0.05$) and that of propionic acid increased ($p<0.05$) by feeding rumensin separately or in combination with ralgro implants.

## INTRODUCTION

Various feed additives and subcutaneous implants have been successfully used by the feedlot industry to stimulate growth and improve feed utilization. Rumensin is a biological active compound produced by a strain of streptomycin synamoninsin and has been showed to promote body weight gain and alter rumen fermentation, thus producing more propionic acid ( Utley et al., 1976).

Ralgro as growth promoter was used for increasing the average daily gain and improving feed efficiency in small ruminants( Mohsen et al., 1992).

The aim of the present study was to investigate the effect of feeding rumensin and ralgro implantation on performance and rumen activity of growing lambs.

## MATERIALS AND METHODS

Twenty four Egyptian male Rahmany lambs with an average body weight of 19.0 kg were divided into four similar groups and randomly assigned to one of the four experimental treatment. One group of animals was left without treatment to serve as control. The second and fourth groups were fed on 20 mg rumensin per head per day, whilst animals in the third and the fourth groups were implanted subcutaneously at the base of the middle of the left ear at the beginning of the experiment (12mg ralgro per head).

All animals were fed on berseem hay as a sole roughage in amounts equivalent to 1% of the animal`s body weight supplemented with the concentrate mixture (13.8% crude protein). The daily amounts of concentrate mixture were adjusted weekly according to individual changes of the experimental animal's body weight to cover their requirements according to NRC (1985). The chemical composition of feeds (Table 1) were determined according to A.O.A.C. (1984). Daily feed allowances were offered in almost two equal meals at8.00 a.m. and 4.00 p.m. and fresh water was available at all times. Lambs in each treatment were group fed and actual feed intake of each group was recorded daily. The experiment tasted for 110 days. Fasting body weight was individually recorded in two successive days weekly. Blood samples were taken 3 hours after the morning feeding from the jugular vein ot three lambs in each group to determine glucose, urea, haemoglobin and plasma protein as described by (Marsh et al., 1965). Rumen liquor samples were obtained (from the same animals of the blood samples) 3 hours after the morning feeding at the end of the experiment, using a rubber stomach tube inserted into the rumen via the o esophagus. Rumen liquor was strained through four layers of cheese cloth. Ph was determined directly using Beckman`s PH meter. Total and differential protozoa counts were determined according to (Mohsen et al., 1992).

Ruminal total volatile fatty acids` concentration (VFAs) were determined by steam distillation as described by (Warner, 1964). Individual VFAs were determined according to (Byers, 1980). The experimental data were statistically analysed according to (Snedecor and Cochran, 1982).

## RESULTS AND DISCUSSION

The averages of daily body weight gain during the whole experimental period (110 days) were 90.0, 105.0, 107.3 and 112.7g respectively for the treated groups (Table 2). Results indicated that feeding rumensin alone or in combination with ralgro implants or ralgro implants alone cause a significant ($P<.0.5$) increase in daily gain by 16.7, 25.3 and 19.2% respectively, compared to the non-treated control group. The results of the present study agree with those obtained by many works. Utley et al. (1975) and (1976) reported that heifers fed rumensin alone or in compbination with ralgro gained more ($P< 0.05$) than the controlled 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 cause an improvement in body weight gain. Hutchinson et al. (1992) and Mohsen et al. (1993) ovserved that implanted lambs with zeranol had greater ($P<.0.05$) daily gain than non-implanted lambs.

It was noticed that the daily dry matter (DM) intakes were nearly similar in all experimental groups, Table (2). These results are in agreement with those obtained by Utley et al. (1976) and Mohsen et al., (1981). Feed efficiency was improved by 18.9, 21.8 and 24.5% respectively for the treated groups compared with the control group. It is interesting to note here that lambs which were fed rumensin in combination with ralgro implants gave a superior improvement by lambs implanted with ralgro alone than those fed rumensin separately, Utley et al. (1976) observed that adding rumensin to the ration of heifers improved feed efficiency by 9.6% compared with non-treated control. Average daily gain was higher and feed conversion more efficient in implanted lambs compared with non-implanted ones (Wilson et al., 1972 and Jones et al., 1997).

The averages of rumen pH values were nearly similar in all experimental groups (Table 3). These results are in agreement with those of Dinius et. at., (1976) and Utley et. al., (1976).

Ammonia-N concentrations in the rumen fluid were similar for lambs fed rumensin alone or in combination with ralgro or implanted with ralgro alone compared with non-treated control (Table 3). These results are in agreement with those of Dinius et. al., (1976). Utley et. al. (1976) and Takwa (1990). In contrast to findings, Mohsen et al., (1992) reported that rams and bucks implanted with zeranols showed a remarkable increase in ammonia nitrogen.

Total ruminal volatile fatty acids' concentration increased by feeding rumensin alone or in combination with ralgro or ralgro implants alone. The molar proportion of both acetic and butyric acids decreased ($P<.0.05$) and that of propionic acid increased ($P< 0.05$) by feeding feed additive rumensin separately or in combination with ralgro. Ralgro did not show any effect on the molar proportion of the VFAs. These results agree with those of potter et al., (1974), Dinius et al., (1976), Utley et. at., (1976) and Mohsen et. al., (1992). Lower acetate/propionate rations were observed in the rumen fluid of lambs fed rumensin alone or in combination with ralgro (Table 3). Implanted lambs did not show any effect compared to the non-treated control. Significantly lower ($P<.0.01$) acetate/propionate ratios were observed in cattle fed monension (Harvey et. al., 1975).

Mean values of blood haemoglobin, blood glucose, plasma protein and blood urea are presented in Table (4). Results show that blood haemoglobin was nearly similar in the four different treatments. The implanted lambs showed higher Hb concentration than that of the other treatments, but the differences were not significant. In contrast to findings, Mohsen et. al., (1992) and (1993) showed that Hb concentration was higher ($P<0.05$) in the implanted lambs than the untreated ones. The implanted lambs (12mg/hd) and those fed rumensin (20mg/hd/day) in combination with ralgro showed a remarkable decrease in both blood glucose and blood urea compared with either animals fed rumensin alone or untreated control (Table 4). The decrease in blood urea by ralgro implantation could reflect a reduced urea synthesis, increased recycling to the rumen and increased in nitrogen retention (Mohsen et. al., 1993). These results suggest that ralgro may shift amino acids away from degradation for energy and toward the production of protein (Takwa 1990). Plasma protein in implanted lambs and in lambs fed rumensin in combination with ralgro showed a slight increase compared to either fed rumensin alone or the non-treated control group. These results are in agreement with those obtained by Mohsen et. al., (1992, 1993).

Results in Table (5) indicated that the total protozoa number had slightly increased in the treated group of animals compared to the non-treated control group, three hours after feeding. Diplodinium and polyplastron also increased. Mohsen et. al., (1992) found a slight increase in total protozoa numbers in lambs implanted with zeranol. Richardson et. al., (1975) reported that protozoa numbers may be decreased by feeding monensin and this depends on the diet.

Table 1: Chemical composition of diets fed to lambs during the experimental period

| Item | On dry basis (%) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Dry Matter (%) | Organic matter | Crude protein | Ether extract | Crude fibre | Nitrogen free extract | Ash |
| Berseem hay | 89.10 | 87.42 | 13.25 | 1.96 | 31.22 | 41.04 | 12.53 |
| Concentrte mixture | 88.87 | 89.69 | 13.80 | 3.74 | 15.49 | 58.63 | 8.34 |

Table 2: Influence of rumensin and ralgro implants on lambs performance

| Item | Control | Rumensin | Ralgro | Rumensin+ Ralgro |
|---|---|---|---|---|
| Initial body weight, kg | 19.2 | 18.9 | 19.0 | 18.8 |
| Final body weight, kg | 29.1 | 30.5 | 30.8 | 31.2 |
| Daily gain, gm | 90.0 | 105.0* | 107.3* | 112.7* |
| Relative growth rate, % | 51.6 | 61.4 | 62.1 | 66.0 |
| Improvement over control, % | - | 16.7 | 19.2 | 25.3 |
| Daily feed DM intake, kg | 0.95 | 0.91 | 0.93 | 0.90 |
| Feed DM/gain, kg | 10.6 | 8.6* | 8.7* | 8.0** |
| Improvement over control. % | - | 18.9 | 21.8 | 24.5 |
| Duration of experiment, days | 110 | 110 | 110 | 110 |

* (P<.0.05) ** (P<0.01)

Table 3: Effect of feeding rumensin and ralgro implants on rumen activity

| Item | Control | Rumensin | Ralgro | Rumensin+ Ralgro |
|---|---|---|---|---|
| pH | 6.42±0.60 | 6.28±0.78 | 6.30±0.67 | 6.35±0.57 |
| NH3-N(mg/100ml) | 9.56±1.64 | 8.42±0.97 | 9.12±1.17 | 8.61±1.46 |
| Total VFAs, (Meq./100ml) | 13.03±1.37 | 15*.20±1.97 | 15.06*±1.55 | 16.11*±0.83 |
| Molar proportion | | | | |
| Acetic | 52.30 | 50.62 | 53.16 | 48.73** |
| Propionic | 26.65 | 36.36* | 27.02 | 42.92** |
| Aceticpropionic | 1.96 | 1.39 | 1.97 | 1.14 |
| Butyric | 18.76 | 11.12* | 17.81 | 4.80** |

* (P<.0.5) ** (P<0.01)

Table 4: Effect of feeding rumensin and ralgro implants on some blood parameters

| Item | Control | Rumensin | Ralgro | Rumensin+ Ralgro |
|---|---|---|---|---|
| pH (g/100ml) | 11.18±0.13 | 11.30±0.19 | 11.42±0.29 | 11.40±0.45 |
| Glucose (mg/100 ml) | 60.10±0.84 | 59.12±0.75 | 56.60*±1.02 | 58.06*±0.42 |
| Plasma protein (g/100ml) | 7.32±0.17 | 7.62±0.15 | 8.02±0.05 | 8.06±0.09 |
| Urea (mg/100ml) | 5.22±0.48 | 4.96±0.16 | 3.73*±0.35 | 3.62*±0.18 |

* (P<.0.05)

Table 5: Effect of feeding Rumensin in combination with ralgro implants on protozoa counts in sheep (x $10^4$ ml)

| Item | % | | | | | |
|---|---|---|---|---|---|---|
| | Total No. | Entodinium | Diphodinium | Polyplastron | Ophryoscolex | Dasytricha |
| **Before Feeding:** | | | | | | |
| Control | 3.62±1.08 | 86.72 | 4.90 | 5.80 | 2.32 | 0.26 |
| Rumnisin | 3.50±1.30 | 86.48 | 5.10 | 6.01 | 2.20 | 0.21 |
| Ralgro | 3.60±0.85 | 86.98 | 4.89 | 5.92 | 2.02 | 0.19 |
| Rumensin + Ralgro | 3.66±0.60 | 86.11 | 5.22 | 6.02 | 2.42 | 0.23 |
| **After feeding:** | | | | | | |
| Control | 3.46±0.45 | 87.76 | 4.50 | 5.62 | 1.92 | 0.20 |
| Rumnisin | 3.86±0.92 | 85.80 | 5.80 | 6.12 | 2.02 | 0.26 |
| Ralgro | 3.72±0.64 | 87.28 | 4.75 | 5.81 | 1.98 | 0.18 |
| Rumensin + Ralgro | 3.90±1.48 | 86.08 | 5.10 | 6.22 | 2.32 | 0.28 |

## REFERENCES


- AOAC (1984): Official Methods of Analysis, 13th Ed., Assoc. of Official Analytical Chemists, Washington, D.C., USA.
- Bergstrom, C. and L.R., Maki (1976): Coccidiostatic action of Monensin Fed to Lambs. A,M. J. Vet. Res. 37-79.
- Byers, F.M. (1980): Effect of Limestone, Monensin and Feeding Level on Corn Silage net Energy Value and Composition on Growth in Cattle. J. Anim. Sci. 50: 1127.
- Dinius. D.A., M.E. Simpson and P.B. Marsh (1976): Effect of Monensin Fed With Forage on Digestion and the Ruminal Ecosystem of Steers. J. Anim. Sci. 42:229.
- Harvey, R.W., A.C. Linnerud and D.F. Tugman (1975): Effect of Monensin on Performance of Stocker Cattle fed Corn Silage and Urea Treated Corn Silage, Annual Report, North Carolina State University 230 USA.
- Hutchinson, J.P., L.W., Green, G.E. Carstens and F.M. Byers (1992): Effect of Zeranol and two dietary levels of calcium and phosphorous on performance, carcass and blood characteristics and calcium status in growing lambs. J. Anim. Sci., 60: 1346.

- Jones, B.A, M.K. Neary, D.L. Hancock, E.P. Berg, J. Huffman and J.R. Flanders (1997): Effect of zeranol implantation and yeast supplementation on performance and carcass traits of finishing wether lambs. Sheep and Goat Research Journal, 13:15.
- March, W.F., B. Fingerhut and H. Milker (1965): Automated and manual direct methods for the determination of blood. Clin. Chem. 11: 624.
- Mohsen, M.K., A.M. El-Hakim and H.M. el-Gendy (1992): Efficacy of zeranol implants on utilization of feeds and rumen activity in ruminants. International Conference on Manipulation of Rumen Micro-Organisms to improve Effeciency of Fermentation and Ruminant Production. Aex. Univ. Egypt, 20-22 September 1992.
- Mohsen, M.K., A.M. El-Hakim, A.Y. Salem and M.A. Ibrahim (1993): Effect of ralgro implantation on the performance and some blood constituents of lambs. J. Agric. Sci. Mansoura, Egypt. 18: 1629.
- Mohsen, M.K., R.L. Vetter and W.F. Wedin (1981): Rumensin in free-choice mineral supplement for grazing steers and subsequent feedlot performance. J. Agric. Res., Tanta Univ., 7:55.
- NRC (1985): Nutrient Requirement of Sheep, 6th Revised Edition. The National Research Council, Washington D.C.
- Potter, E.L., C.O. Cooley, A.P. Raun, L.F. Richardson and R.P Rathmacher (1974): Effect of monensin on daily gain of cattle on pasture. Proceedings, Western Sec. ASAS, 25: 3243.
- Richardson, A.P., A.P. Raun and E.L. Potter (1975): The effect of rumensin on ruminal parameters on beef cattle and sheep. Conference on Rumen Function, Chicago, 111. P.11. USA.
- Snedecor, G.W. and W.G. Cochran (1982): Statistical Methods, 6th Ed. ISU Press Ames, Lowa, USA.
- Takwa, E.A. (1990): Effect of some hormones on utilization of feeds in ruminants. M.Sc., Fac. of Agric. University of Alexandria, Egypt.
- Utly, P.R., G.L. Newton and W.C. McCormick (1975): Runensin, ralgro and synovex-H for growing cattle. J. Anim. Sci., 41: 423, (Abst.).
- Utley, P.R.; G.L. Newton, R.J. Ritter and W.C. McCormick (1976): Effects of feeding monensin in combination with zeranol and testosterone-estradiol implants for growing and finishing heifers. J. Anim. Sci. 42: 754.
- Warner, A.C.J. (1964): Production of volatile fatty acids in the rumen, methods of measurements, Nutr. Abst. & Rev. 34: 33.
- Wilson, L.L., M.L. Borger, A.D. Petson, M.C. Rugh and C.F. Orley (1972): Effects of zeranol, dietary protein level and methionine hydroxy analogue on growth and carcass characters and certain blood metabolites in lambs. J. Anim. Sci., 35: 128.

## الملخص العربي

### تأثير التغذية على الرومنسن وزرع الرالجرو على أداء ونشاط الكرش في الحملان

محمد كامل محسن
قسم الإنتاج الحيواني- كلية الزراعة بكفرالشيخ- جامعة طنطا

استخدم في هذه الدراسة أربعة مجاميع كل مجموعة تحتوي على ستة حملان رحماني (ذكور) متوسط أوزانها ١٩ كجم في تجربة نمو (١١٠ يوم) لدراسة تأثير استخدام الرومنسن مع أو بدون زرع الرالجرو على الأداء وبعض صفات الدم ونشاط الكرش.

وكانت المجاميع كالتالي:

١- المجموعة الغير معاملة (مجموعة المقارنة).
٢- المجموعة التي أعطيت ٢٠ ملجم رومنسن لكل رأس يومياً.
٣- المجموعة التي أعطيت ١٢ ملجم رالجرو عن طريق الزرع بصوان الأذن.
٤- المجموعة التي أعطيت ٢٠ ملجم رومنسن + ١٢ ملجم رالجرو.

وتم تغذية الحيوانات في المجاميع الأربعة على ١% من وزن الجسم دريس برسيم + العليقة المركزة (١٣,٨% بروتين كلي) حسب الاحتياجات.

وأوضحت النتائج:

١- أن إستخدام الرومنسن فقط أو مع الرالجرو أو زرع الرالجرو فقط سبب زيادة جوهرية في معدل الزيادة اليومية في وزن الحملان بمعدل ١٦,٧%، ٢٥,٣%، ١٩,٢% مقارنة بمجموعة المقارنة.

٢- كانت كميات المادة الجافة المستهلكة متساوية تقريباً في كل المجاميع.

٣- نقص تركيز كل من حمض الخليك والبيوتريك معنوياً بينما زاد تركيز حمض البروبيونيك معنوياً عندما أعطى الرومنسن منفرداً أو مع الرالجرو.

٤- لم يظهر أي تأثير لكل من الرومنسن والرالجرو على صفات الدم أو بروتوزوا الكرش سواء العدد الكلي أو الأنواع المختلفة.