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Effects of rosemary extracts incorporation on Barbarine lamb's growth and carcass characteristics

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Abstract. The aim of this experiment was to study the effect of rosemary extracts (RE) incorporation on diet intake, lambs growth, carcass characteristics and composition. Thirty two fat tail Barbarine lambs (19.9±2 kg body weight (BW)) were divided into 2 homogeneous groups according to BW. All sheep were fed 50% alfalfa caps and 50 % concentrate. Two types of concentrate were used, the Control (C) and the experimental (RE) in which 0.06% of RE (measured on fresh weight of the concentrate) was added. At the end of the growth trial (60 days), all animals were slaughtered. The BW at slaughter was similar for both groups (25 kg). Dressing percentage was not affected by RE incorporation (54.4 *vs.* 51.7 for C and RE, respectively). The gut was more developed for C group (1614 *vs.* 1495 g). The carcass weight was similar for both groups (10.9 *vs.* 10.7 kg for C and RE, respectively). Carcasses of RE group showed comparable fatness (22%), less muscle (50.6 *vs*. 52.5%) and a higher bone proportion than C one. In conclusion, small quantity of RE did not show significant effects on lambs' growth and carcass composition.

Keywords. Rosemary extracts – Lambs - Growth – Carcass composition.

Effets de l'incorporation des extraits de romarin sur la croissance et les caractéristiques de la carcasse des agneaux de race Barbarine

Résumé. *Le but de cette expérience était d'étudier l'effet de l'incorporation des extraits de romarin (RE) sur la croissance et la composition de la carcasse des agneaux. Trente-deux agneaux de race Barbarine (19,9 kg de poids vif (PV)) ont été divisés en 2 lots homogènes en fonction de PV. Tous les agneaux ont reçu une ration composée de 50% de bouchons de luzerne et 50% d'aliment concentré. Deux types d'aliment concentré ont été utilisés, le témoin (T) et l'expérimental, qui correspond à T avec 0,06% de RE. À la fin de l'expérience (60 jours), tous les animaux ont été abattus. Le PV à l'abattage a été similaire pour les deux groupes (25 kg). Le rendement en carcasse n'a pas été affecté par l'incorporation de RE (54,4* vs *51,7 % respectivement pour T et RE). Le tube digestif a été plus développé pour le lot T (1614* vs *1495 g). Le poids de la carcasse froide était similaire pour les deux lots (10,9* vs *10,7 kg respectivement pour T et RE). Les carcasses du lot RE ont montré la même composition en gras (22%), moins de muscle (50,6* vs *52,5%) et plus d'os que le lot T. En conclusion, la faible dose de RE n'a pas montré d'effet significatif sur la croissance des agneaux et la composition de la carcasse.*

Mots-clés. *Extraits de Romarin – Agneaux – Croissance – Composition de la carcasse.*

I – Introduction

The livestock extensive system has become ineffective in spite of the use of different diets rich in energy. These plans can be improved by a number of additives and growth promoters (antibiotics, hormones, etc.). In recent years, the prohibition of use of antibiotics and growth promoters (OJEU, 2003), which had shown adverse effects on human and environment, required the use of new alternatives. At this level, plant extracts such as essential oils have

received increased attention as potential alternatives to growth promoters for animal production (Chaves *et al.,* 2008; Nieto *et al.*, 2010). The objective of this experiment was to study the effect of rosemary (*Romarinus officinalis*) extracts (RE) incorporation on lambs growth, carcass characteristics and composition.

II – Material and methods

1. Animals and diets

The experiment was carried out at INRAT experimental farm of Bourebiaa. Thirty-two Barbarine lambs with an average body weight (BW) of 19.9±2 kg were used. They were divided into 2 homogeneous groups according to BW and concentrate type. All lambs were fed 50 % alfalfa caps + 50% concentrate (two meals a day) and had free access to water. Two types of concentrate were used: the control (C) was composed of barley (80%), soybean meal (18%) and CMV (2%), while the experimental concentrate (RE) represents the C concentrate mixed with of 0.06% (measured on fresh weight of the concentrate) of rosemary extract.

2. Measurements

Feed intake was recorded daily and sheep BW weekly. At the end of the growth trial (60 days), all animals were slaughtered. Body weight at slaughter (BWS) was recorded. Red cut-down (liver, kidneys, spleen, and heart); omental and mesenteric fat (OMF) and all fraction of the digestive tract were weighed. Cold carcass weight (CCW) was recorded after 24 h of storage of the carcasses at 4°C. After removing the tail, each carcass was divided longitudinally into two halves; the left sides were dissected into fat, muscles and bones.

3. Statistical analysis

A one-way analysis of variance for diet effect on growth, slaughter parameter and carcass composition using GLM procedure in SAS (1989) was applied. Then, the test Duncan was used to compare diet mean effects (α=0.05).

III – Results and discussion

1. Growth performance and slaughter parameters

Feed intake was similar for all lambs. Consequently, lambs had similar daily weight gain without significant difference between groups (Table 1). The growth rates recorded in this study (81 *vs.* 76 g for C and RE, respectively) are generally lower than the average daily gains reported for the same breed in other studies (Atti and Abdouli, 2001; Mahouachi and Atti, 2005). RE incorporation did not affect CCW and, consequently, DP which was slightly higher for C group. The lack of significant effects can be explained by the similarity between the energetic level of diets and considering the fact that these parameters are strongly correlated to the SBW (Sents *et al.*, 1982; Atti and Khaldi, 1988; Atti *et al.*, 2003), which, in the present study, was unaffected by RE incorporation.

2. Non-carcass components

No significant difference was recorded for the weight of the different red cut-down (Table 2) between groups. RE incorporation slightly ameliorated testicles weight (30 *vs.* 27 g for RE and C group, respectively) which is correlated to spermatozoa production (Mahouachi, 1985). Thus, RE may have an important interest on reproduction parameters. Conversely, RE did not show positive effect on digestive tract which had higher weight for control group. This result was not in

agreement with those of Noirot *et al.* (2007) reporting positive effects of dietary essential oils effect on digestion. Since the lambs were slaughtered at similar body weights, there were no significant differences for all parameters mentioned above which confirms the results of Atti and Khaldi (1988).

Table 1. Body weight (BW) parameters, carcass weight and dressing percent (DP)

Group	C	RE	SEM	P- values
Daily gain (g)	81	76	1.01	0.64
SBW (kg)	25.1	24.9	0.97	0.90
EBW (kg)	20.1	20.7	0.85	0.52
CCW (kg)	10.9	10.7	0.54	0.71
RDP %	54.4	51.7	0.15	0.41

C, control group; RE, rosemary essential oils group; SEM: standard error.

Table 2. Rosemary extracts incorporation effect on non-carcass component

Group	C	RE	SEM	P-values
Red cut-down (g)	1046	1051	3.5	0.90
Testicles (g)	27.4	30.3	0.5	0.57
Rumen (g)	618.9	583.6	2.5	0.21
Intestines (g)	868.3	793.3	10.3	0.52

C, control group; RE, rosemary essential oils group; SEM: standard error.

3. Carcass composition

The results of weight (g) and proportion (%) of different tissues in whole carcasses are presented in Table 3. There were no significant differences between groups. Muscle weight and proportion were slightly higher for C group (5413 *vs.* 5346 and 52.5 *vs*. 50.6% for C and RE group, respectively). On the contrary, RE incorporation increased bone weight (2667 *vs.* 2404 g for RE and C group, respectively) and proportion (25.5 *vs.* 23.8% for RE and C group, respectively). Lambs of both groups presented the same carcass fat proportion (22%). This result was in agreement with those of Atti *et al*. (2011) who did not find significant differences in carcass composition (muscle and fat) between Barbarine lambs in feedlot receiving control concentrate and 200 g of aromatic plants (artemisia and rosemary) and others receiving only control concentrate. The similar intake and the comparable energetic level of the diets, together with the short experimental period of the experience could explain the absence of significant differences between groups.

IV – Conclusion

Small quantity of RE incorporation did not show significant effects on lamb's growth and carcass composition.

Table 2. Rosemary extracts incorporation effect on proportion of different carcass tissues

Group	C	RE	SEM	P values
Muscle (g)	5413	5346	22.1	0.79
Muscle (%)	52.5	50.6	0.1	0.23
Fat (g)	2402	2376	23.0	0.92
Fat (%)	22.6	22.4	0.1	0.90
Bone (g)	2404	2667	12.8	0.07
Bone (%)	23.8	25.5	0.1	0.11

C, control group; RE, rosemary essential oils group; SEM: standard error.

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