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Feeding of Sheep by the Pulp of Orange to Mograne (Kenitra)

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Abstract: *In Morocco sheep farming is a real national wealth that can be appreciated through the high number of sheep that exceeds 16 million head in a normal year and by the diversity of the breeds which is a good guarantee for the future. [1] ANPA Seminar on "Genetic improvement for sheep farming", 24-25 November 2000, Rabat.*

In Our experiment, the 60 sheep submitted a diet consisting of barley, bean, orange pulp and wheat bran for a period of 3 months with 2 rations / day.

In this work, we studied the by-products of citrus fruit obtained after juice extraction, the sheep that fed our formula F1 passed with an average weight of 24,700 to 47 kg. The F2 diet (untreated pulp) resulted in a final average weight of 43.2kg. Lot F3 has grown to no more than 32kg in average weight.

It can be concluded that these energy-rich by-products can be suitably used in fattening rations for fattening.

So our diet has the sole purpose of satisfying the different nutritional needs (energy, proteins, minerals ...). The study of mineral deficiencies in sheep allowed us to note that there is no deficiency between the sheep

Keywords: *orange pulp, medium weight, mineral deficiencies, pulp treated.*

1. INTRODUCTION

Sheep farming is an important activity for Morocco and Moroccans. Its predominance throughout the Kingdom stems from its adaptation to the majority of agro-ecosystems that exist there.

The adaptation of this species is due to the biodiversity of its races on the one hand and to its flexibility as a unit of production compared to the socio-economic and land context of Morocco on the other hand. [2] Prof. Hamid Narjisse Director of the Institute of Agronomic Research)

The fattening of lambs is relatively easy to undertake since it requires only a small investment and a low technicality. Nevertheless, in order to be successful in fattening, certain conditions must be respected and a minimum of breeding knowledge is required. [3] (Ministry of Agriculture and Marine Fisheries Transfer of Technology in Agriculture December 2008).

The orange pulp has excellent taste and is used mainly in animal feed.

During our experiment, the sheep were subjected to a diet consisting of barley, beans, wheat bran and orange pulp for a period of 3 months with 2 rations / d

The feed ration is compared to a diet consisting of untreated pulp (F2) and a feed ration used by farmers in the region (F3). Feeding trials were carried out on 60 lambs heads divided into Three lots.

In order to have the efficiency of the prepared food ration, parameters were measured and monitored.

2. MATERIAL AND METHODS

2.1. Lamb Preparation and Feeding Trials

2.1.1. Distribution of lots

Feeding trials were conducted on 60 lambs aged 4 to 6 months, all male. Three batches were prepared:

Lot 1: feed ration consisting of the treated pulp

Lot 2: food ration consisting of untreated pulp

Lot 3: Food of the region as a control + pasture

2.1.2. Description of diets

Diet F1: the pulp treated with other ingredients.

Diet F2: untreated pulp with other ingredients

Diet F3: a food formula used by the region's breeders

The proportions of the formulas prepared are shown in the following table:

Table1. *Diets and rations distributed to the three batches of sheep*

Ingredients	**Proportion of food formulas**				
	(F1)		**(F2)**		**(F3)**
Pulp treated	18%		------		
corn	16%		16 %		25%
beans	29%		29%		
barley	37%		37 %		25%
Untreated Pulp	------		18%		
Grazing					50%
Total	100%		100%		100%

2.2. Statistic Study

Several factors affect the effect of feeding and the growth of the animal: animal-related factors; Factors related to the environment, factors related to the food. However, zootechnicians have found indicators of response **including the GMQ.**

During this experiment we followed the periodic evolution of the weight of the lambs. Each week, all lambs are weighed using a scales, a daily weighing of the quantity of feed distributed, of the food refused and of the fecal matter produced, is carried out.

2.3. Average Daily Gain

The average daily gain (G.M.Q) is the weight gain achieved between two weighings in relation to the number of days separating them. It is expressed in g / d.

2.4. Food Efficiency

Growth performance analysis alone is not enough to designate the best regime. This is why food consumption and food conversion (or consumption index) are used.

The amount ingested is determined by the difference between the quantities dispensed and rejected for each animal by dividing the total quantity consumed by the number of sheep and the feeding period.

2.5. Weight of the Carcass

It is the weight of the animal after slaughter, devoid of skin, paste, head and offal. It makes it possible to calculate the carcass yield

2.6. Carcass Yield

It is the weight of the carcass in relation to the live weight of the animal

Carcass yield (%) = (PC / PV) x100

PC: carcass weight taken after removal of head, skin, quarters and offal

PV: live weight

3. RESULTS

3.1. Clinical Observations

The daily clinical observations performed found no evil effects perceptible on any animal

3.2. Evolution of Average live Weight of Lambs

To follow the evolution of the body weight of the lambs, we divided 60 heads into three batches. These lambs were weighed every Tuesday morning for three months. (See table)

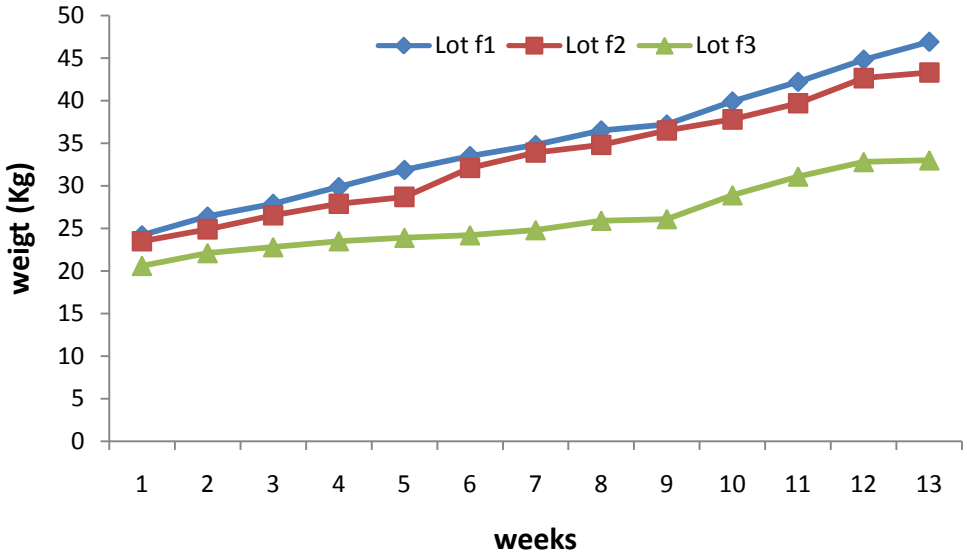
Table2. *The average weight gain of each batch*

Batches	Initial Weight (Kg)	Final Weight (Kg)	Gpm (Kg)
batch (F1)	24,700	47	22,3
batch (F2)	23,400	43, 2	19,7
batch (F3)	20,500	32	11.5

It can be seen from the table that the gain of the average lot weight F1 is higher with a value of 22.3, compared with the other batches F2 with a value of 19.7 and the batch F3 with a value of 11.5. That lot F1 has a very significant weight compared to the other batches this confirms the effectiveness of the diet used.

The follow-up of the initial and final weight of the lambs showed a very large difference between the formulas, for example in the initial state, the average weight of F1 is 24,700 kg, and the weight of F3 is 20,500 kg , So there is a difference of 4.2 kg. In the final state, the gap becomes very important: it reaches 15kg

These results demonstrate the efficacy and benefits of the ration used



Picture1. Monitoring the average daily gain of each batch by the function of time

According to the three formulas, the GMQ of each batch increases continuously. The average daily earnings for the lot F1 (PT), lot F2 (PNT) and lot F3 (AC) are 265.47 (g / d), 235.71 (g / d) and 136.90

Table3. *Average daily gain of the three batches*

Formulas	Batches	Awg(Kg)	Adg(G/D)
F1	Batch (PT)	22.300	265.47
F2	Batch (PNT)	19.700	234.52
F3	Batch (AC)	11.500	136.90

3.3. Quantity Ingested

This quantity is determined by the difference between the quantity of food distributed and the quantity refused.

According to the table it can be said that the quantity ingested by the batch (F3) is the lowest 920.09 (g / d) which results in a low weight gain, whereas the other batches show a very large quantity ingested, It is 951.50 for lot F2 and 953.64 for lot F1

Table4. *average ingested amount for each batch*

Batchs	Average Ingested Amount (G/D)	Adg (G/D)
F1	953.64	265.47
F2	951.50	234.52
F3	920.09	136.90

3.4. The Consumption Index

The consumption index is determined by the ratio of the intake of food consumed per day and per animal to the average daily gain.

The table shows that the values of each batch are different:

Batch F1 has a value of 3.52 lower than the other values F2 which has a value of 4 and the other batch F3 which has a higher value 6.25

Table 5: consumption index for each batch

Batch	Consumption Index
F1	3.52
F2	4
F3	6.25

4. BIOCHEMICAL PARAMETERS

In this step, blood samples were taken, which allowed the analysis of mineral compounds, proteo-energetic compounds and energetic serum compounds.

The results obtained will be presented according to 3 groups of animals studied:

- a group does not receive any mineral or proteo-energy supplementation,
- a second group receives a diet rich in untreated citrus pulp
- a group with a mineral supplement in the form of the treated pulp.

4.1. Mineral Compounds

4.1.1. Ca Concentration

Table6. *Ca concentration (mg / dl)*

Animal Group	Number of Samples	Résults	Standard
O.N.C	1	9.5	8 à 12
O.P.	1	9.6	
O.C	1	10.5	

The table shows the different concentrations of Ca (mg / dl) in the 3 groups of sheep

It should be noted that the first group of sheep fed by a diet used by the mogran region had a value of 9.5 Ca (mg / dl), so the second group fed by the untreated orange pulp had a value of 9.6 Ca (mg / dl), on the other hand, 10.5 Ca (mg / dl) was obtained for the 3rd group fed by the treated pulp

4.1.2. Mg Concentration

Table7. Concentration of serum Mg (mg / dl)

Animal Group	Number of Samples	Résults	Standard
O.N.C	1	2,9	1 ,8 a 3,2
O.P.	1	2 ,4	
O.C	1	1.92	

According to the table, which represents the concentration of serum Mg (mg / dl), for the three groups of sheep, for the first group, we have a value of 2.9 (mg / dl) For the other groups, there were 2.4 (mg / dl) for the animals fed by the untreated pulp and 1.92 (mg / dl) for the animals fed by the treated pulp

The concentration of serum Mg of the animals complemented by the treated pulp is represented by the standard (1, 8 to 3.2)

4.1.3. Phosphorus –Concentration

Table8. *Concentration of serum P (mg / l)*

Animal Group	Number of Samples	Résults	Standard
O.N.C	1	6.2	≥ 4.5 mg/l
O.P.	1	6.7	
O.C	1	6.8	

The table shows the concentration of serum phosphorus (mg / l) in the three groups of animals

According to the table, the serum phosphorus concentration (mg / l) value for sheep fed with the treated pulp is 6.8 (mg / l), this value is higher than that of sheep fed by the pulp (6.7 mg / l) and ovine animals fed by the mogran region (6.2 mg / l)

4.1.4. Sodium Concentration

Table10. Concentration of serum Na (mEq / dl)

Animal Group	Number of Samples	Résults	Standard
O.N.C	1	150	141a160
O.P.	1	145	
O.C	1	148	

The table shows the results of the sodium concentrations found in relation to the three groups of animals studied.

The value of the sodium concentration is 150 (mEq / dl) in non-supplemented sheep, whereas this value is a 145 (mEq / dl) in sheep fed by the untreated pulp and for sheep fed by the treated pulp This value can reach 148 (mEq / dl)

4.2. Compounds of Protein-Energy

4.2.1. Glucose

Table11. *Concentration of glucose (mmol / l)*

Animal Group	Number of Samples	Résults
O.N.C	1	3.6
O.P.	1	3.3
O.C	1	2.9

The table shows the results of the blood glucose concentrations found for the three groups of animals studied.

The results show that the blood glucose concentration in non-supplemented sheep is 3.6 (mmol / l), higher than that of the blood glucose concentration in ovine animals fed by the untreated pulp (3.3 mmol / L) and also that of the concentration of ovine fed by the treated pulp (2.93 mmol / L)

4.2.2. Urea

Table12. Uremia of concentration (mmol / l)

Animal group	Number of Samples	Résults
O.N.C	1	5. 30
O.P.	1	4.10
O.C	1	3.90

The table shows the results of the serum urea concentrations found for the three groups of animals studied.

According to the results of urea concentrations for each group of animals, it is found that for uncomplemented sheep the value of urea concentration is higher with 5.30 mmol / l, for complemented animals the concentration is 3.90mmol / l; Whereas it is 4.10 mmol / l for animals receiving untreated pulp.

4.2.3. Total Protéines

Table13. *Protein Concentration (g / l)*

Animal group	Number of Samples	Résults
O.N.C	1	76.9
O.P.	1	74.8
O.C	1	66.10

The table shows the results of the serum protein concentrations found for the three groups of animals studied.

The table shows the serum protein concentrations for each group of animals. For sheep not complemented, the serum protein concentration is higher with 76.9 g / l, for animals supplemented the concentration is 66.10 g / l; Whereas it is 74.8 g / l for animals receiving untreated pulp.

4.2.4. Concentration of Total Cholesterol

Table14. *Total cholesterol concentration (g / l)*

Animal Group	Number of Samples	Résults
O.N.C	1	0.79
O.P.	1	0.65
O.C	1	0.55

The table shows the results of serum total cholesterol concentrations found for the three groups of animals studied.

The general value of serum cholesterol concentrations is 0.79 g / l in supplemented animals and 0.65 g / l in animals receiving untreated pulp. This value is 0.55 g / l in sheep supplemented with treated pulp.

5. DISCUSSION AND CONCLUSION

From the results obtained in this study, it can be seen that the first group of sheep fed by a diet used by the Mogran region has a value of 9.5 Ca (mg / dl), so the second group fed by the Pulp of untreated orange has a value of 9.6 Ca (mg / dl). On the other hand, 10.5 Ca (mg / dl) is obtained for the 3rd group fed by the treated pulp. These results are similar to the usual values reported by (Meschy, 1989) which have 9 to 12 mg / dl. [4]

The overall mean of the serum Mg concentration (mg / dl) for the three groups of sheep, we note that for the first group we have a value of 2.9 (mg / dl), whereas for the other groups Groups, there were 2.4 (mg / dl) for the animals fed by the untreated pulp and 1.92 (mg / dl) for the animals fed by the treated pulp. The usual values are 2.5 to 3.2 mg / dl (Mc Dowell, 1985) [5] . Analysis of the frequency distribution of serum magnesium concentrations shows that there is a deficiency for OP sheep and ONC sheep. Mc Dowell et al. (1993) reported that normal magnesimy in sheep is in the order of 1.8-3.2mg / dl and those with a serum level of 1.2-1.8 mg / dl are moderately hypomagnesemic, while the others with a rate less than or equal to 1.2mg / dl are severely hypomagnesemic. This can cause neuro muscular disorders.

The serum phosphorus concentration (mg / l) value for sheep fed with the treated pulp is 6.8 (mg / l), this value (6.7 mg / l) and ovine animals fed by the mogran region (6.2 mg / l). Lamand, 1975, N.R.C. 1985, MC Dowell et al., 1993) [6] . The frequency distribution of serum phosphorus concentrations shows that there is no deficiency in each batch.

According to the results of urea concentrations for each group of animals, it is found that for uncomplemented sheep the value of urea concentration is higher with 5.30 mmol / l, for complemented animals the concentration is 3.90mmol / l; Whereas it is 4.10 mmol / l for animals receiving untreated pulp. Their values are in the usual standards cited in the literature (Sykes and Russel 1979) [7], which ranged from 1.6 to 10.6 mmol / l at (Bllod et al., 1983) [8] which was 2.2 to 7.4 mmol / l. This can be explained by nitrogen-rich intakes.

The mean serum glucose concentration in uncomplemented sheep is 3.6 (mmol / l), higher than that of blood glucose concentration in sheep fed with untreated pulp (3.3 mmol / l) and also in that of The concentration of sheep fed by the treated pulp (2.93 mmol / l). These values are similar to the

biochemical norms of glycemia reported by many authors (Braun et al., 1978, Kaneko, 1989, Ranawera et al., 1979) [9] .

Serum protein concentrations for each group of animals, for unmatched sheep the value of serum protein concentration is greater with 76.9 g / l, for animals supplemented the concentration is 66.10 g / l; Whereas it is 74.8 g / l for animals receiving untreated pulp. These values are similar to the biochemical norms of blood glucose reported by many authors (Keay 1981, Blood et al., 1983, Fontaine, 1987) [10] .

The general value of serum cholesterol concentrations is 0.79 g / l in supplemented animals and 0.65 g / l in animals receiving untreated pulp. This value is 0.55 g / l in sheep supplemented with treated pulp.

From the results obtained, the prepared diet F1 gave good results. They were superior to results obtained with lambs fed untreated F2 or lambs fed with food from region F3.

O.N.C: group receiving no mineral supplements or protein-energy.

O.P: group receiving a diet rich in citrus pulp untreated.

O.C: group receiving a mineral supplement in the form of the treated pulp.

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