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Fattening sheep by citrus pulp

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Abstract: The livestock sector is an activity that has a great importance in the national economy in general and in rural areas in particular. It is considered as an income-generating activity for million homes in rural areas. Our experience has focused on 60 lambs that have been divided into three batch receiving different diets for a period of 3 months. We have found differences between the performance of growth of lambs of the three batchs : the sheep that have fed our formula F1 have past with an average weight of 24,200 to46,900kg. The diet F2 (pulp not treated) has helped to achieve a final average weight of 43.300kg. The batch F3 has seen a growth that has not exceeded the 33.000kg in the average weight. The reported test has allowed acquiring good results with particularly the formula that is based on the treated pulp.

The study of mineral deficiencies of sheep in the region of Morgrane, has allowed us to see that there is a deficiency at the level of the Magnesium which represents the dominant constituent of the bone structure for the 2 witnesses (F2) and(F3). The mineral complementation in this case is an effective mean of preventing mineral deficiencies and malnutrition.

Keywords: Citrus pulp, average weight, mineral deficiencies, treated pulp.

Introduction

Sheep farming is an important component to meet the needs of our country when it comes to red meat. A balanced diet is essential for normal growth and proper functioning of the body. It is undoubtable that a balanced diet can prevent chronic diseases. Sheep feed primarily on plants. Every day, the animal must consume the amount of food necessary to cover its needs. The orange pulp has a special effect. It is characterized by a wealth of soluble sugars and pectins which will allow it to have a very high-energy value of around 1.1UFL / kg DM (Marshall and Besancenot, 1997) [1] .The orange pulp of the excellent taste is mainly used in feeding the animals. It is a highly digestible residue, which can be used as a source of energy for ruminants that can complement the rations based on poor fodder. Improving food quality was the object of our work. As well, we will examine the effect of 3 food formulas on the growth and biochemical composition of the blood of sheep tests.

1. MATERIALS AND METHODS

1.1the animal and study period

in our study ; 60brebis clinically healthy aged 2 to 4 months , from a semi ranching (practice of grazing and distribution concentrate on rainy days without real rationing) , they were randomly selected to be the subject of an application followed by a diet containing orange pulp to one visit per week during the 3 months.

1.2 Description of the Diet

Formula (F1) that we prepared is compared with the other two witnesses foods :
Food of the region (f2) and feed by grazing (f3) .The proportions of prepared food formulas are shown in the following table :

Table I: the diets and rations distributed for three batchs of sheep

ingrédients	**Proportion of food formulas**		
	(F1)	**(F2)**	**(F3)**
Treated Pulp	18%	------	
corn	16%	16 %	25%
Beans	29%	29%	

barley	37%	37 %	25%
untreated Pulpe	------	18%	
Grazing			50%
Total	100%	100%	100%

1.3 Statistic study

To measure feed efficiency on the weight of lambs and monitor their growth, we selected 60 sheep we have divided them into three batches, comprising the same number. These lambs were weighed every Tuesday, at the same time for three months.

Differences were considered significant for ensuring the quality of the diet. Weight gain (wg), the amount ingested, consumption index, average daily gain (ADG) and mortality were the main growth performance tested as part of this experience during the rearing phase

*average daily gain

Average daily gain (ADG), corresponds to the ratio of the weight of the animal from one period to the number of days in the same period. ADG is expressed in g / d

*sheep carcass yields

The carcass yield is defined as the ratio of carcass weight and live weight of an animal. Many authors, who have done work on the same issue, have shown that sheep carcass yield is between 40 and 48% (Dumas, 1977; Sanfo, 1983; Nassa, 1990; Sawadogo, 1991) [2].

A good diet would improve carcass performance Right after evisceration, head, legs, skin, white offal (gut full "TDP" and empty "TDV") and organ meats (liver, lungs, heart) have weighed to slaughter

Carcass yield (%) = (PC / LW) * 100

PC: carcass weight becomes hot after the removal of the head, skin, four feet and giblets.

LW: Live Weight.

*index of consumption

This is a parameter on which we can build to increase the confidence level vis-à-vis promoting consumption of our product. index of consumption is defined as the amount of food consumed on the body weight of the lamb.

CI = quantity of food consumed (kg) / Body weight

1.4 Withdrawals

The samples were taken from the jugular vein in vacuum tubes with anticoagulant then the tubes follow a double centrifugation (4000T / 10 minutes) to obtain clear serum.. Samples that have high values exceed the upper limit of the apparatus is carried dilutions. The tubes of blood collected were used for the establishment of serum electrolytes, liver function tests , lipid and other ....

RESULTS

1 - clinical observations.

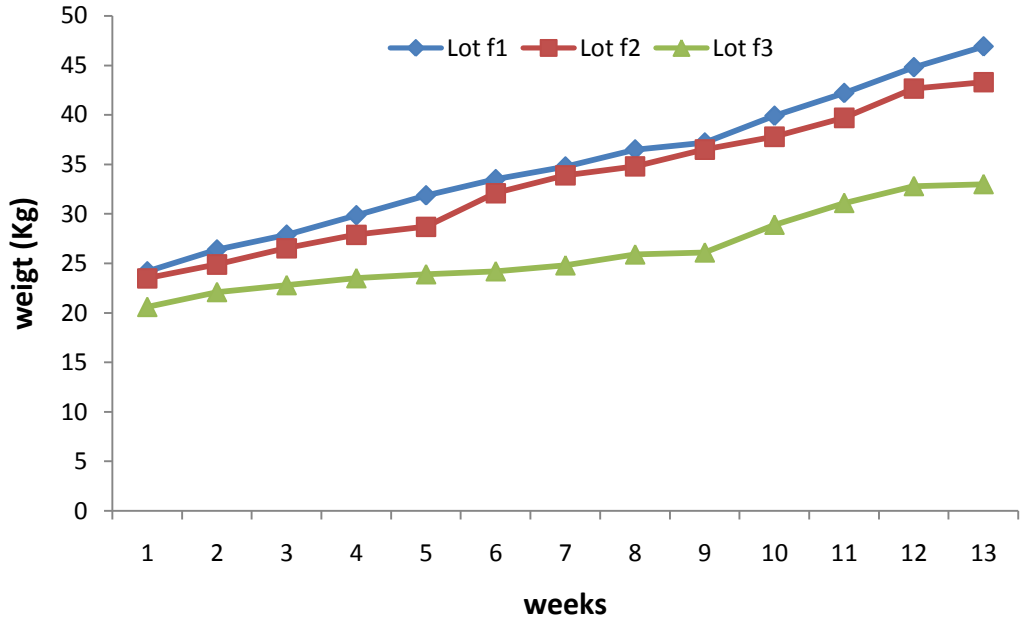
The daily clinical observations performed found no discernible ill effects on any animal

1.2 –Evolution of the average live weight of lambs

The following table provides information on the evolution of the weight of each batch

Table II: the gain of the average weight of each batch

batches	**initial weight (Kg)**	**final weight (Kg)**	**GPM(Kg)**
batch(F1)	24,200	46,9	22,7
batch(F2)	23,500	43, 3	19,8
batch(F3)	20,600	33	12,4



Picture 1 : monitoring the average daily gain of each batch by the function of time

The above graph shows the evolution of the weight of the sheep on the basis of the applied diet. The results obtained shows that the weight of these animals know a systematic increase . This explains the quality of the followed diet, and its positive effect on the herd .

Results Relating to the live weight of lambs and their weight gains that are reported in table and graph allow to see that the ADG of each batch increases continuously . Average daily earnings are respectively270.23g / d ; 235.71g / d and 147.61g / d for F1 (PT) ; batch F2 (PNT) and batch F3 (AC).

Table III: Average daily gain of the three batches

formulas	**Batches**	**AWG(kg)**	**ADG(g/d)**
F1	**Batch(PT)**	22.700	270.23
F2	**batch(PNT)**	19.800	235.71
F3	**batch(AC)**	12.400	147.61

1.3. Amount ingested:

We determining the average amount ingested by the difference between the quantity of food distributed and the amount refused .

Table IV: average ingested amount for each batch

batchs	**average ingested amount (g/d)**	**ADG (g/d)**
F1	958.40	270.23
F2	956.50	235.71
F3	930.80	147.61

The consumption of the lamb's feed submitted to three diets saw a remarkable difference as the amount ingested by batch(F3) is lowest with 930.80 (g / d) , which is explained by the low gain weight, whereas the amount ingested for the two lots (F1) and (F2) remains high , with 958.40 (g /d) for (F1) and 956.50 (g / d) to (F2).

1.4 The consumption index

We determined the consumption index by the ratio of the amount ingested of food consumed per day per animal and average daily gain . According to the table , we see that the index of consumption differs from one batch to another . batch F3 has the highest index with 6 .30 , against by the two other batches F1 and F2 have respectively 3.54 and 4.05

Table V: consumption index for each batch

batch	consumption index

F1	3.54
F2	4.05
F3	6.30

2. Biochemical parameters

The results will be presented in 3 groups of animals studied ; one group receiving no mineral supplements or protein-energy , a second group receiving a diet rich in citrus pulp untreated and the third group receiving a mineral supplement in the form of the treated pulp.

-2.1mineral compounds

- Ca Concentration

The results of the serum calcium level found in relation to the three groups of animals studied are presented in the following table

Table VI : Ca concentration (mg / dl)

Animal group	Number of samples	Résults
O.N.C	1	9.4
O.P.	1	9.4
O.C	1	10.3

-Mg concentration

The results of magnesium found in relation to the three groups of animals studied are presented in the table :

Table VII : Concentration of serum Mg (mg / dl)

Animal group	Number of samples	résults
O.N.C	1	0.91
O.P.	1	1.11
O.C	1	1.82

phosphorus -concentration :

The results of the phosphorus found in relation to the three groups of animals studied are presented in the table :

Table VIII : Concentration of serum P (mg / l)

Animal group	Number of samples	Résults
O.N.C	1	68
O.P.	1	71
O.C	1	124

Sodium Concentration

The results of the sodium concentrations found in connection with the three groups of animals studied are presented in the table :

Table 9 : Concentration of serum Na (mEq / dl)

Animal group	Number of samples	Résults
O.N.C	1	148
O.P.	1	142
O.C	1	144

2.2Compounds of Protein-energy

-Glucose

The results of the serum concentrations of glucose found in relation to the three groups of animals studied are presented in Table ;

Table X: Concentration of glucose (mmol / l)

Animal group	Number of samples	Résults
O.N.C	1	3.7
O.P.	1	3.4
O.C	1	2.9

- Urea :

The results of serum concentrations of urea found in relation to the three groups of animals studied are presented in the following table

Table XI : Uremia of concentration (mmol / l)

Animal group	Number of samples	Résults
O.N.C	1	5.50
O.P.	1	4.17
O.C	1	3.83

Total –Protéines

The results of serum concentrations of the serum concentrations of proteins found in relation to the three groups of animals studied are presented in the following table

Table XII : Protein Concentration (g / l)

Animal group	Number of samples	Résults
O.N.C	1	77.0
O.P.	1	75.5
O.C	1	65.90

-Concentration of total cholesterol :

Results in serum concentrations of total cholesterol found in relation to the three groups of animals studied are presented in Table

Table XIII : Total cholesterol concentration (g / l)

Animal group	Number of samples	Résults
O.N.C	1	0.78
O.P.	1	0.64
O.C	1	0.54

Discussion

According to the results obtained, we hold that the average daily gains (ADG) of lambs are 270.23 g/d; 235.71g/d and 147g.61g/d respectively for the batch (F1), batch (F2) and the batch (F3). The recorded results are similar to those found by Chbab.[3].

At the level of the amount ingested by the sheep, the values found are 958.40g/d,956.5.g/d and 930.80g/d respectively for batches (F1), (F2) and (F3). The index of consumption was 3.54 for the batch F1,it is lower than those of the other lots and to those recorded by Rahmi [4]which varies between 4.87to 8.4.The average yield is calculated to 62% for the batch F1 that is superior to the other batches F2 and F3; this result is not similar to that one obtained by chbab[3] which is 48.20%.

The results obtained have confirmed the beneficial effect of the citrus pulp. This sub-product may offer enormous opportunities to be used in animal feed. In effect, it stores a high energy Content .

The overall average concentrations of calcium found in this study is 9.4mg/dl for non- complemented sheep and for those receiving untreated pulp. While in the sheep receiving the treated pulp, the calcium concentration is 10.4mg/dl. These results are similar to the usual values reported by (Meschy,[5] who found values between 9 and 12mg/dl.

For the magnesium, the gained general average is evaluated to 0.91mg/dl, 1.11mg/dl and 1.82mg/dl, respectively in the non- complemented sheep, as well as for those receiving the treated and non-treated pulp. However, the usual values are 2.5 to 3.2 mg/dl (Mc Dowell, [6]).The analysis of distribution of the frequency of serum concentrations in magnesium shows that there is a deficiency for the OP and ONC sheep. Mc Dowell and his collaborators [7] have pointed out that the normal concentration of magnesium in sheep is of the order of 1.8 to 3.2mg/dl and that those with a serum in the order of 1.2-1.8 mg/dl are moderately hypomagnesaemia. The other have a rate less than or equal to 1.2mg/dl that are severely hypomagnesaemia; which may cause neuromuscular disorders.

The general average serum concentrations of phosphorus, found in this study was 68mg / l in unsupplemented sheep, 71mg / l in sheep fed the diet supplemented with the untreated pulp and 124mg in sheep receiving the treated pulp. Perston [8] reported that serum phosphate below 40mg / l is an index of deficiency. In contrast, according N.R.C and McDowell et al. [9], this deficiency threshold would rise to 45 mg / l. The distribution of phosphorus in serum concentrations frequency shows that there is no deficiency in each batch.

The average serum levels of urea are 5.50mmol/l in unsupplemented sheep,, 4.17mmol / l in sheep fed the mixture of untreated pulp and 3.83mmol / l for sheep supplemented.Their values are within the normal standards

cited in the literature (Sykes,[10]). The limit values of the standard are included between1.6 to 10.6mmol/l. As for Bllod and al, [11], the standard according to him is between 2.2à7.4mmol/l. This can be explained by high contribution of nitrogen.

The average serum concentration of glucose is 3.7 mmol / l in unsupplemented sheep, 3.4mmol / in sheep fed untreated pulp mixed and 2.9mmol / L in the supplemented sheep. These values are similar to the biochemical standards of the blood glucose levels reported by the authors (Braun et al. [12]).

For the average serum concentrations of protein, it is 77g / l in unsupplemented sheep, 75g / l in sheep supplemented untreated pulp mixed and 65.90mmol / l in sheep supplemented. These values are similar to those reported by biochemical standards (Fontaine, [13]).

Conclusion:

Following the results found, the F1 prepared formulation yielded effective results. They were superior to results obtained with lambs fed untreated pulp F2 or feed used by farmers of the F3 region.

The study of mineral deficiencies in sheep showed that: for animals that received mineral supplementation, the average values obtained for the parameters studied are broadly comparable to those of the unsupplemented animals and animals receiving untreated pulp .

As for magnesium, the values of serum obtained for OP sheep and ONC are below the usual values described in the bibliography.

Therefore, it is apparent from all the tests performed that the mineral supplementation of sheep is an effective mean to prevent the mineral deficiencies and malnutrition.

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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