

Cottonseed cake replacement by soybean pulp in the diet of West African Dwarf lambs in Benin: zootechnical and economic performances

Yaya Idrissou^{1*} Hilaire Sorébou Sanni Worogo¹
 Alassan Seidou Assani¹ Jean Aïtchégnon Ayena¹
 Brice Gérard Comlan Assogba¹ Ibrahim Alkoiret Traoré¹

Keywords

Sheep, lamb feeding, weight gain, cottonseed meal, soybean products, Benin

Submitted: 16 June 2018
 Accepted: 11 March 2020
 Published: 29 June 2020
 DOI: 10.19182/remvt.31875

Summary

Cottonseed cake was substituted by soybean pulp in the diet of West African Dwarf (Djallonke) sheep, at the Pélébina livestock farm in the commune of Djougou, Benin, in order to assess its effect on growth and economic performances. Thirty ram lambs (120 ± 10 days old, 12.65 ± 0.16 kg body weight) were divided into three homogeneous groups of ten (12.6 ± 1 , 12.6 ± 0.97 , and 12.7 ± 0.85 kg body weight for R1, R2, and R3, respectively). All lambs received daily the same basal diet of 70% *Panicum maximum* C1 and 10% corn bran, plus either 20% cottonseed cake (R1), or 10% cottonseed cake and 10% soybean pulp (R2), or 20% soybean pulp (R3). After a 15-day adaptation period, the fattening period lasted 60 days. No difference ($p > 0.05$) was found between groups on the average daily weight gain (R1, 77.5, R2, 73.1, and R3, 70.2 g/day), although the dry matter intake of R3 (441 g/day/lamb) was lower ($p < 0.0001$) than that of R1 (482 g/day/lamb). The R3 diet generated a higher net margin (6042 FCFA) than R1 (5613 FCFA) and R2 (5728 FCFA) diets.

■ How to quote this article: Idrissou Y., Sanni Worogo H.S., Seidou Assani A., Ayena J.A., Assogba B.G.C., Alkoiret Traoré I., 2020. Cottonseed cake replacement by soybean pulp in the diet of West African Dwarf lambs in Benin: zootechnical and economic performances. *Rev. Elev. Med. Vet. Pays Trop.*, 73 (2): 107-111, doi: 10.19182/remvt.31875

■ INTRODUCTION

Population growth has increased the demand in meat products in Benin and has led to imports of meat and live animals (Babatoundé et al., 2009). This causes a major currency hemorrhage, which is likely to increase in the coming decades as the population increases (Houndonougbo et al., 2012). With 1,836,000 head (FAOstat, 2018), small ruminants play a major role in the coverage of national meat requirements in Benin. Sheep play a very important socioeconomic role particularly in religious festivals (Nantoumè et al., 2006). Sheep

fattening has thus increased in rural, and in urban and periurban areas (Gbangboché, 2005).

Fattening uses several techniques ranging from traditional ones with agricultural by-products to more intensive ones that include agro-industrial by-products (Somda, 2001). Among these agro-industrial by-products, cottonseed and soybean cakes have been the most used (Bougouma-Yaméogo et al., 2002). However, feed rationing based on these by-products (Idrissou et al., 2017) is technically difficult because of their little availability and accessibility especially to small-scale livestock farmers. Soy cheese has now become part of the feed habits of rural and urban populations in Benin. The transformation of soybean into cheese produces a by-product, the soybean pulp also known as *okara*. This by-product is available locally and less expensive than cakes (cotton and soy). It can therefore be an interesting nutritional and economic alternative in sheep fattening. Studies in Benin report the use of soybean pulp in poultry (Dossou, 2012) and rabbit (Alabi et al., 2019) diets with satisfactory results. However, no

1. Laboratory of Ecology, Health and Animal Production, Faculty of Agronomy, University of Parakou, 01 PO Box 123, Parakou, Benin.

* Corresponding Author
 Tel: +229 61 08 49 40; Email: yayaidriss2617@gmail.com



<https://creativecommons.org/licenses/by/4.0/>

studies evaluated the soybean pulp in the diet of ruminants in Benin. The purpose of this study was to evaluate the zootechnical and economic performances of fattening West African Dwarf (Djallonke) sheep fed diets containing different proportions of soybean pulp in place of cottonseed cake.

■ MATERIALS AND METHODS

Study area

The experiment was conducted at the Pélébina livestock farm in Djougou Commune, Donga Department. The farm is located at 32 kilometers from Djougou and covers 25 hectares. It has a tropical climate with two seasons, a rainy season from mid-April to mid-October and a dry season from mid-October to mid-April. The annual rainfall ranges from 1000 to 1500 millimeters for 75 to 140 days of rain. The average annual temperature is approximately 27.5 degrees Celsius (ASECNA, 2017).

Animals

Thirty non-castrated West African Dwarf male lambs (120 ± 10 days old, averaging 12.6 ± 0.16 kg initial body weight), born and raised at Pélébina farm, were used. The experiment took place from November 2016 to February 2017 and lasted 75 days, i.e. a 15-day adaptation period followed by a 60-day fattening period. At the beginning of the adaptation period, the sheep were divided into three groups of 10, based on their body weight and each group received its experimental ration. During the same period, all animals were vaccinated against sheep and goat plague and injected with long-acting oxytetracycline and multivitamins. Internal deworming using albendazole and external deworming using Amitix in tick baths were also carried out. The sheep were indoors in individual stalls, and litter was made of rice husks.

Feed and mode of distribution

Three diets were tested (Table I). The control diet (R1) consisted of 20% dry matter (DM) cottonseed cakes (CSC), 10% DM corn bran and 70% DM *Panicum maximum* C1. The experimental diets incorporated soybean pulp at 10% or 20% of the total diet replacing 50% or 100% of CSC, respectively. CSC were purchased in feed stores in Djougou and soybean pulp was purchased in a dry form from women processing soybean into soy cheese. It was stored in the farm.

Panicum maximum C1 was distributed at the feed rack in two meals, at 8:00 am and 12:00 pm. Dietary supplements (corn bran, CSC, soybean pulp) were offered in one meal at 16:00 pm. These supplements were presented in flour form to the animals. The quantities of *P. maximum* distributed to each animal were determined based on 1.5 kg DM / 100 kg of live weight (LW) and the dietary supplement intake based on 2.5 kg DM / 100 kg of LW. Thus, the amount of feed served varied as the body weight increased. The lambs had free access to water and a Lamdam'Bloc limestone (785 mg NaCl, 647 mg Ca, 3500 mg Mg, 500 mg Mn, 700 mg Zn, 3000 ppm Fe).

Data collection

The feeds were weighed before distribution and served individually to the lambs. Refusals were weighed the next day before a new distribution. The determination of the quantity of feed ingested was made by the difference between the quantities distributed and refused daily. Samples of each type of feed offered and refused were taken in all animal stalls once a week to determine DM, the organic matter (OM), crude fiber (CF), crude protein (CP), fat content, and mineral matter (MM), following official methods approved by AOAC (2005). The neutral detergent fiber (NDF) and acid detergent fiber (ADF)

were analyzed by the method of Van Soest and Wine (1967). The fodder unit for meat feed (UFV), the protein digested in the small intestine allowed by the nitrogen (PDIN), and the protein digested in the small intestine allowed by the energy (PDIE) were estimated using equations from the French National Institute for Agricultural Research (Baumont et al., 2007). Analytical results are presented in Table II.

Table I

Composition and nutritional value in the diets of West African Dwarf lambs in Benin

| Centesimal composition (% DM) | R1* | R2* | R3* |
|-------------------------------|-------------------|-------------------|-------------------|
| Corn bran | 10 | 10 | 10 |
| Soybean pulp | 0 | 10 | 20 |
| Cottonseed cake (CCS) | 20 | 10 | 0 |
| <i>Panicum maximum</i> | 70 | 70 | 70 |
| Limestone | <i>Ad libitum</i> | <i>Ad libitum</i> | <i>Ad libitum</i> |
| Chemical composition g/kg DM | | | |
| DM g/kg brut | 794.77 | 793.12 | 791.47 |
| CP | 130.98 | 131.61 | 132.24 |
| NDF | 568.17 | 540.39 | 512.61 |
| ADF | 342.23 | 345.63 | 349.07 |
| CF | 252.48 | 255.38 | 258.28 |
| MM | 87.59 | 84.95 | 82.31 |
| PDIN | 86.62 | 87.13 | 87.64 |
| PDIE | 96.40 | 96.49 | 96.59 |
| Net energy (UFV) | 0.8 | 0.79 | 0.78 |

* Basal diet of 70% *Panicum maximum* C1 and 10% corn bran; R1: basal diet supplemented with 20% CCS; R2: with 10% CCS and 10% soybean pulp; R3: with 20% soybean pulp

DM: dry matter; CP: crude protein; NDF: neutral detergent fiber; ADF: acid detergent fiber; CF: crude fiber; MM: mineral matter; PDIN: protein digested in the small intestine allowed by the nitrogen; PDIE: protein digested in the small intestine allowed by the energy; UFV: fodder unit for meat feed

Table II

Chemical composition of feeds given to West African Dwarf lambs in Benin

| | <i>Panicum maximum</i> | Corn bran | Soybean pulp | Cottonseed cake |
|------------------|------------------------|-----------|--------------|-----------------|
| DM (g/kg) | 732.5 | 871.2 | 958 | 974.5 |
| OM (g/kg DM) | 901 | 947.9 | 961 | 934.6 |
| CF (g/kg DM) | 313.4 | 89 | 150 | 121 |
| CP (g/kg DM) | 87.2 | 109.6 | 301.2 | 294.9 |
| ADF (g/kg DM) | 352 | 604.3 | 211 | 177 |
| NDF (g/kg DM) | 545 | 636.1 | 337.5 | 615.3 |
| MM (g/kg DM) | 99 | 52.1 | 39 | 65.4 |
| PDIN (g/kg DM) | 54.31 | 70.13 | 213.08 | 207.96 |
| PDIE (g/kg DM) | 76.03 | 103.15 | 165.31 | 164.30 |
| Net energy (UFV) | 0.61 | 1.01 | 1.28 | 1.36 |

DM: dry matter; OM: organic matter; CF: crude fiber; CP: crude protein; ADF: acid detergent fiber; NDF: neutral detergent fiber; MM: mineral matter; PDIN: protein digested in the small intestine allowed by the nitrogen; PDIE: protein digested in the small intestine allowed by the energy; UFV: fodder unit for meat feed

The live weight change in lambs was determined by weighing each animal at the beginning of the experiment, then every two weeks. The animals were weighed at 7:00 am after 12 hours of fasting using a weight scale (50 kg \pm 100 g) before receiving their diet. Average daily gains (ADGs) were calculated every two weeks as well as the consumption index (CI, amount of dry matter ingested per unit of average daily gain).

Statistical analysis

The dry matter intake (DMI), ADG, and CI were analyzed with the one-way analysis of variance (ANOVA) with R software (R Core Team Development, 2017) to test the effects of supplementation on animal performances (with significant differences when $p < 0.05$). Multiple comparison of means was performed with Tukey test (with significant differences when $p < 0.05$).

Economic evaluation methods

Economic efficiency has been evaluated through the calculation of the gross margin (GM) and direct cost margin (Boehlje and Eidman 1984; Kiéma et al., 2008) per animal and per diet. GM is the difference between the total revenue from the sale of animals and the operational cost (costs of acquiring animals, feeds and veterinary products). The direct expense margin is the difference between GM and the depreciation of the equipment specific to the activity.

RESULTS AND DISCUSSION

Chemical composition and nutritional value of feeds

Soybean pulp was richer in CF and ADF than cottonseed cake (Table II). Conversely, NDF and MM contents in cottonseed cake were higher than those in soybean pulp. Soybean pulp and cottonseed cake had similar PDIE and PDIN contents, and energy (UFV). Considering these properties, the diets had almost the same energy and protein content (Table II).

Dry matter intake and growth performance

DMI, CI, and ADG are presented in Table III. DMI was different ($p < 0.0001$) between groups. The highest DMI (482 \pm 18 g/day) was obtained with R1 lambs, and R2 and R3 lambs had similar values with 448 \pm 12 g/day and 441 \pm 14 g/day, respectively. The high intake in R1 lambs compared to R2 and R3 lambs was due to the high palatability of CSC. With regard to the feed consumption index, no significant difference ($p > 0.05$) was observed between groups. These CI values were lower than those of 4.48 to 5.79 obtained by El Fadili (2012) in Morocco in sheep of the same age as ours, but supplemented with a concentrate composed of barley and triticale grains (40%),

sunflower meal (14%), minerals and vitamins (1%), and a commercial pelleted feed (45%). The difference between our results and those of this author could be related to the ration.

The type of diet had no effects ($p > 0.05$) on ADG or the final live weight. The ADGs obtained were 77.50, 73.13 and 70.21 g/day for diets R1, R2 and R3, respectively (Table III). These ADGs were lower than those of 92.60 and 95.70 g/day reported by Simitzis et al. (2008) in lambs of the same age as those in our study. The 92.60 g/day value was obtained in lambs fed a diet containing a concentrated feed and alfalfa hay, whereas 95.70 g/day was obtained in lambs fed the same diet, the only difference being that the concentrated feed was uniformly sprayed with oregano essential oil (1 ml/kg). Otherwise, the ADGs obtained in our study were higher than those of 18.33, 41.11, 57.67 and 58 g/day reported by Montcho et al. (2016) on the complementation of West African Dwarf lambs with multi-nutritional blocks. The differences between our results and those of these authors could be related to the ration. The evolution of the ADGs at 2-week intervals (Figure 1) was not identical in the three groups. During the first and second fortnight, R1 and R2 had a higher ADG ($p < 0.05$) than R3. Then, the ADG of the lambs in R3 increased to reach ADGs similar to those in R1 and R2 ($p > 0.05$).

Economic profitability of fattening

The production cost of one kilogram of each ration was determined based on ingredient costs according to their proportion in the diet. *P. maximum* was harvested from a one hectare fodder plot. The price of this feed was estimated at 50 FCFA/kg. On the market, corn bran and cottonseed cake cost 30 and 150 FCFA/kg, respectively, and soybean pulp 50 FCFA/kg (during the trial period). On this basis, one kilogram of rations in R1, R2 and R3 cost 68, 58 and 48 FCFA,

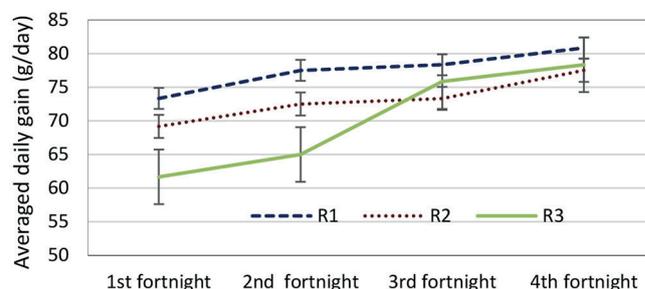


Figure 1: Evolution of average daily gains per fortnight in West African Dwarf lambs in Benin. Basal diet of 70% *Panicum maximum* C1 and 10% corn bran; R1: basal diet supplemented with 20% CCS; R2: with 10% CCS and 10% soybean pulp; R3: with 20% soybean pulp.

Table III

Effects of the diets on various parameters in West African Dwarf lambs in Benin

| | R1 \pm SD* | R2 \pm SD* | R3 \pm SD* | p |
|--------------------------|---------------------------|---------------------------|---------------------------|--------|
| Initial live weight (kg) | 12.6 \pm 1.00 | 12.6 \pm 0.97 | 12.7 \pm 0.85 | 0.997 |
| Final live weight (kg) | 17.3 \pm 1.16 | 17.00 \pm 0.77 | 16.7 \pm 0.66 | 0.66 |
| Total weight gain (kg) | 4.7 \pm 0.43 | 4.4 \pm 0.48 | 4.00 \pm 0.42 | 0.167 |
| ADG (g/d) | 77.50 \pm 7.12 | 73.13 \pm 8.09 | 70.21 \pm 7.04 | 0.167 |
| DM intake (g/d/lamb) | 482 \pm 18 ^a | 448 \pm 12 ^b | 441 \pm 14 ^b | 0.0001 |
| CI (kg DM/kg of growth) | 6.26 \pm 0.56 | 6.19 \pm 0.59 | 6.34 \pm 0.73 | 0.89 |

* Basal diet of 70% *Panicum maximum* C1 and 10% corn bran; R1: basal diet supplemented with 20% CCS; R2: with 10% CCS and 10% soybean pulp; R3: with 20% soybean pulp. SD: standard deviation; ADG: average daily gain; DM: dry matter; CI: consumption index; ^{a,b} Means followed by different superscripts on the same row differ significantly ($p < 0.05$)

respectively. During the 60 days of the experiment, the lambs in R1, R2 and R3 ingested 36.50, 34 and 33.50 kg of fresh material, respectively.

Thus, the feeding cost per lamb was estimated at 2482, 1972 and 1608 FCFA for R1, R2 and R3, respectively. The cost of veterinary care per animal was approximately 425 FCFA. The lick block cost 550 FCFA/animal. The economic results of the fattening of the lambs (Table IV) showed that the production cost of one kilogram of feed was not identical for the three groups. This cost was higher in diet R1 than in the other diets, and lowest in R3, mainly because of the low price of soybean pulp compared to cottonseed cake. All the diets were economically profitable. R3 generated the best net margin with 6042 FCFA (vs 5613 FCFA in R1 and 5728 FCFA in R2). The substitution of cottonseed cake by soy pulp therefore allowed a reduction in the cost of feed and an increase in the farmer's income.

Table IV

Economic parameters of West African Dwarf lamb fattening (FCFA/lamb) in Benin

| | R1* | R2* | R3* |
|---|--------|--------|--------|
| Selling price (A) | 25,900 | 25,500 | 25,400 |
| Purchase price (B) | 16,455 | 16,450 | 16,400 |
| Cost of 1 kg of feed (FCFA/kg) (C) | 68 | 58 | 48 |
| Average amount of feed consumed / lamb (kg) (D) | 36.50 | 34 | 33.50 |
| Average feed cost per animal (E) = (C × D) | 2,482 | 1,972 | 1,608 |
| Medication cost (F) | 425 | 425 | 425 |
| Minerals cost (G) | 550 | 550 | 550 |
| Operational cost (H) = (B + E + F + G) | 19,912 | 19,397 | 18,983 |
| Gross margin (I) = (A - H) | 5,988 | 6,103 | 6,417 |
| Equipment depreciation (J) | 375 | 375 | 375 |
| Direct cost margin (K) = (I - J) | 5,613 | 5,728 | 6,042 |

* Basal diet of 70% *Panicum maximum* C1 and 10% corn bran; R1: basal diet supplemented with 20% CCS; R2: with 10% CCS and 10% soybean pulp; R3: with 20% soybean pulp; 1 € = 655.957 FCFA; source : www.oanda.com

■ CONCLUSION

This study showed that locally available feed resources could help reduce the constraints (high costs, access problems) related to zoo-technical input markets. It also showed that there were opportunities for fattening at a lower cost and higher net profits than with cottonseed cake. Partial or total substitution of cottonseed cake by soybean pulp can achieve these results. This resource is locally abundant in rural and urban areas of Benin. Overall, the enhancement of locally available feed resources in the development of improved meat production techniques is an alternative for intensifying production in developing countries. Their adoption should contribute to improve the development of fattening.

Author contributions statement

YI and ASA participated in the conception and design of the study; JAA collected data and drafted the first version of the manuscript; HSSW and BGCA participated in the design; YI and ASA performed statistical analyses; IAT critically reviewed the manuscript.

Conflicts of interest

The study was carried without any conflict of interest.

REFERENCES

- Alabi C.D.A., Azalou M., Adjassin J.S., Assani A.S., Worogo H.S.S., Idrissou Y., Akpo Y., Alkoiret I.T., 2019. Effet de la granulation d'un aliment avec pulpe de soja (okara) sur l'engraissement de lapins locaux au Nord-Bénin. *Livest. Res. Rural Dev.*, **31** (5)
- AOAC, 2005. Official methods of analysis, 18th edn. AOAC, Washington, DC, USA
- ASECNA, 2017. Données climatiques de la zone Nord-Station de Kandi et Parakou. ASECNA, Bénin
- Babatoundé S., Saïdou A., Guidan M., Mensah G.A., 2009. Effet d'une complémentation à base de légumineuses fourragères cultivées (*Chamaecrista rotundifolia* et *Aeschynomene histrix*) sur les performances des ovins Djallonkés. *Renc. Rech. Ruminants.*, **16** : 54
- Baumont R., Dulphy J.P., Sauvart D., Meschy F., Aufrère J., Peyraud J.L., 2007. Valeur alimentaire des fourrages et des matières premières : tables et prévision. In : Alimentation des bovins, ovins et caprins. Quae, Montpellier, France, 149-179
- Boehlje M.D., Eidman V.R., 1984. Farm management. John Wiley, New York, USA
- Bougouma-Yaméogo V., Nianogo A.J., Somda J., 2002. Rentabilité économique et adoption de la technologie de l'embouche ovine au Burkina Faso (document travail n° 22). SADAOC, Ouagadougou, Burkina Faso
- Dossou T.R., 2012. Effect of okara (soy pulp) on the performance of Rhodes Island Red (RIR) in Republic of Benin. Mém. Ingénieur, Université de Parakou, Bénin, 90 p.
- El Fadili M., 2012. Growth and carcass characteristics of Moroccan INRA180 lambs. *Livest. Res. Rural Dev.*, **24**
- FAOSTAT, 2018. FAO, Rome, Italy, www.fao.org/faostat/fr/#data (accessed 5 June 2018)
- Gbangboché A.B., 2005. Performances zootechniques et paramètres génétiques des ovins Djallonké au Bénin. Thèse Doct., Faculté de médecine vétérinaire, Université de Liège, Belgique, 178 p.
- Houndonougbo M.F., Chrysostome C.A.A.M., Babatoundé S., Lokossou H.R., Agbota B., 2012. Fourrages de *Moringa Oleifera* et de *Gliricidia Sepium* utilisés comme compléments alimentaires efficaces pour nourrir des veaux girolando au Bénin. *Ann. Sci. Agr. Bénin*, **16** : 35-49
- Idrissou Y., Assani S.A., Alkoiret I.T., Mensah G.A., 2017. Performance d'embouche des ovins Djallonké complétés avec les fourrages de *Gliricidia sepium* et de *Leucaena leucocephala* au Centre du Bénin. *Bull. Rech. Agron. Bénin.*, **81** : 1-8
- Kiéma A., Nianogo A.J., Ouedraogo T., Somda J., 2008. Valorisation des ressources alimentaires locales dans l'embouche ovine paysanne : performances technico-économiques et options de diffusion. *Cah. Agric.*, **17**: 24-27, doi : 10.1684/agr.2008.0154
- Montcho M., Babatoundé S., Houndonougbo M.F., Guédou A., Chrysostome A.A.M.C., Aboh B.A., Mensah G.A., 2016. Performances zooéconomiques en milieu réel des ovins Djallonké complétés par les blocs multi nutritionnels (BMM) au Bénin. *J. Rech. Sci. Univ. Lomé*, **18** (4) : 9-22
- Nantoumè H., Diarra C.H.T., Traoré D., 2006. Performance et rentabilité économique de l'incorporation des quatre fourrages de qualité pauvre dans des rations d'engraissement des moutons Maures. *Livest. Res. Rural Dev.*, **21**
- R Core Team Development, 2017. R a language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria
- Simitzis P.E., Deligeorgis S.G., Bizelis J.A., Dardamani A., Theodosiou I., Fegeros K., 2008. Effect of dietary oregano oil supplementation on lamb meat characteristics. *Meat Sci.*, **79**: 217-223, doi: 10.1016/j.meatsci.2007.09.005
- Somda J., 2001. Performances zootechniques et rentabilité financière des ovins en embouche au Burkina Faso. *Biotechnol. Agron. Soc. Environ.*, **5** (2) : 73-78
- Van Soest J.P., Wine R.H., 1967. Use of detergent in the analysis of fibrous feed. IV. Determination of plant cell wall constituents. *J. Assoc. Offic. Anal. Chem.*, **50** (1): 50-55, doi: 10.1093/jaoac/50.1.50

Résumé

Idrissou Y., Sanni Worogo H.S., Seidou Assani A., Ayena J.A., Assogba B.G.C., Alkoiret Traoré I. Substitution du tourteau de coton par la pulpe de soja dans la ration des ovins Djallonké au Bénin : performances zootechniques et économiques

Le tourteau de coton a été substitué par la pulpe de soja dans la ration des moutons Djallonké à la ferme d'élevage de Pélébina dans la commune de Djougou au Bénin, afin d'évaluer son effet sur la croissance et les performances économiques. Trente agneaux (âgés de 120 ± 10 jours et pesant en moyenne $12,65 \pm 0,16$ kg) ont été répartis dans trois lots homogènes de dix animaux ($12,6 \pm 1$; $12,6 \pm 0,97$; $12,7 \pm 0,85$ kg de poids vif, respectivement pour les lots R1, R2 et R3). Tous les agneaux ont reçu quotidiennement le même régime de base comprenant 70 % de *Panicum maximum* C1 et 10 % de son de maïs, plus soit 20 % de tourteau de coton (R1), soit 10 % de tourteau de coton et 10 % de pulpe de soja (R2), soit 20 % de pulpe de soja (R3). Après une période d'adaptation de 15 jours, l'engraissement a duré 60 jours. Aucune différence ($p > 0,05$) n'a été constatée entre les lots sur la prise de poids quotidienne moyenne (R1, 77,5 ; R2, 73,1 ; et R3, 70,2 g/jour), bien que l'ingestion de matière sèche de R3 (441 g/jour/agneau) ait été inférieure ($p < 0,0001$) à celle de R1 (482 g/jour/agneau). La ration R3 a généré une marge nette (6042 FCFA) supérieure à celles de R1 (5613 FCFA) et de R2 (5728 FCFA).

Mots-clés : ovin, alimentation des agneaux, gain de poids, tourteau de coton, produit à base de soja, Bénin

Resumen

Idrissou Y., Sanni Worogo H.S., Seidou Assani A., Ayena J.A., Assogba B.G.C., Alkoiret Traoré I. Reemplazo de la torta de semillas de algodón por pulpa de soja en la dieta de corderos enanos de África occidental en Benín: resultados zootécnicos y económicos

La torta de semillas de algodón fue sustituida por pulpa de soja en la dieta de ovejas Djallonke, en la finca ganadera Pélébina en la comuna de Djougou, Benín, con el fin de evaluar su efecto sobre el crecimiento y el desempeño económico. Treinta corderos machos Djallonke (120 ± 10 días de edad, $12,65 \pm 0,16$ kg de peso corporal) se dividieron en tres grupos homogéneos de diez ($12,6 \pm 1$, $12,6 \pm 0,97$ y $12,7 \pm 0,85$ kg de peso corporal para R1, R2 y R3, respectivamente). Todos los corderos recibieron diariamente la misma dieta basal de 70% de *Panicum maximum* C1 y 10% de salvado de maíz, más 20% de torta de semillas de algodón (R1) o 10% de torta de semillas de algodón y 10% de pulpa de soja (R2), o 20% de pulpa de soja (R3). Después de un período de adaptación de 15 días, el período de engorde duró 60 días. No hubo diferencias ($p > 0,05$) entre los grupos en el aumento de peso diario promedio (R1, 77,5; R2, 73,1; y R3, 70,2 g/día), aunque la ingesta de materia seca de R3 (441 g/día/cordero) fue menor ($p < 0,0001$) que la de R1 (482 g/día/cordero). La dieta R3 generó un margen neto más alto (6042 FCFA) que las dietas R1 (5613 FCFA) y R2 (5728 FCFA).

Palabras clave: ovino, alimentación de corderos, ganancia de peso, harina de semilla de algodón, productos de la soja, Benin

