Global Advanced Research Journal of Agricultural Science (ISSN: 2315-5094) Vol. 6(8) pp. 220-232, August, 2017 Issue.
Available online http://garj.org/garjas/home

Full Length Research Paper

Integration of safety and environmental protection in the small and medium sheep and goat farming for fattening in Togo (West Africa)

Matéyendou Lamboni[1, 2] and Ouézou Yaovi Azouma*[1, 2]

[1]Université de Lomé, Ecole Supérieure d'Agronomie / Département de Génie Rural et Machinisme agricole 01 BP 1515 Lomé 01, Togo, Tél. : (228) 22 25 41 97 Fax : (228) 22 21 85 95
[2]Equipe de Recherche sur la Mécanisation Agricole et le Génie des Procédés (ERMAP) 01 BP 1515 ESA/UL, Lomé 01, Togo

Accepted 22 July, 2017

The West Africa Agricultural Productivity Programme (WAAPP), Togo project promotes the creation of Service companies and organization of producers of sheep and goats for fattening, slaughtering and cutting, "ESOP-Meat". This project activity aims to support 1200 farmers in 5 years. Safety of sheep and goats and environmental conservation of breeding sites are two factors that help to ensure in one hand, the quality of animal produced by small and medium farms and in other hand, the improvement of the competitiveness of products from slaughter and cutting. In order to address these requirements from the creation of ESOP-Meat, diagnostic surveys of 78 on 450 farmers (17%) and the monitoring visits of the implementation of the project on the field were made. These work showed that 92% of farms are located in the middle of habitation by third parties and therefore do not meet health and environmental standards. Furthermore, only 19% of farmers have improved traditional sheepfold and 3.8% of farmers have drinkers, feeders and racks. The new improved traditional sheepfold with an area of 17.4 m^2 for 18 adult sheep, being introduced, presents a containment problem because 37% of beneficiary farmers largely have more than 25 adult animals. The nutrition and watering standards are not met. Good hygienic practices to ensure the safety of animal products are not applied. Faced to all these shortcomings, this work proposes a process of integration of safety and environmental protection in small and medium farms of sheep and goats for fattening.

Keywords: Togo, environment, food safety, fattening, sheep and goat

INTRODUCTION

Factors of development and employment, agro-food chains constitute a major asset to Togo's economy. In distinguishing itself by its integration into the socio-economic activities of households, diversity of genetic potentials well adapted to the agro climatic conditions, fattening of small ruminants is one of the first animal sector, vector of development and wealth. In Togo, 71.8%

*Corresponding author: azouma@yahoo.com

of rural households rear small ruminants in often difficult conditions and the technical supervision is often too superficial in traditional farms. This explains not only weak performances but also environmental problems (DSID, 2013).

Face to this situation which compromises the durability of family breeding of goat and sheep, maintaining and improving the competitiveness of the farming systems of our countries compared to competitors of West African Economic and monetary union (WAEMU) and the third countries are the major challenges (CTA, 2006). Also, consumer health protection and the environment are factors that determine the competitiveness of food products and facilitate their access to national and international markets. Thus, to ensure the success of the program of creation of "Business Services and Organization of Producers" for meat supply (ESOP Meat) developed by Non-Governmental Organisation (NGO) Business Planning and Development (BPD), taking into account different constraints and factors identified is essential.

In effect, this research work enables us to apply the process of integration of the safety of foodstuffs (Lamboni and Azouma, 2013) during the creation of small and medium farms of sheep and goat for fattening in Togo. It aims at a better consideration of the requirements of the regulations, sanitary and environmental standards and that of animal welfare then ends with diagrams proposal, plan and standard layout and equipment of sheep and goat farming buildings.

MATERIAL

Geographical Area of Study

This study took place in Togo, in four prefectures including two of the plateau region (Haho and Ogou) and two of the central region (Blitta and Sotouboua) (Figure1). The climate is the sudanoguinean type with 4 seasons (two rainy and two dry): a big rainy season covering the period of mid-march to mid-July with maximum rain in June; a small dry season from mid-July to mid-August; a small rainy season from mid-August to mid-November and a big dry season from mid-November to mid-March. The temperatures vary between 20°C and 34°C; the hottest month of the year is February and August the coldest. Insolation is very high during dry season and humidity relatively higher in rainy season.

"ESOP Meat" Project Presentation

The "ESOP Meat" is a private enterprise erected from the coaching of small and medium sheep and goat breeding whose asset consists of 3 agent groups: bestowal's financial backer through the promoter ETD, ESOP employees share officials and contributions of farmers through the sale of animals per slaughter unit (ETD, 2012). The "ESOP Meat" project expected to cover 1200 farmers in 5 years comprises 2 major components namely goat and sheep fattening components and goat and sheep slaughter-cutting component. Goat and sheep fattening key activities consist in a study of the supply market and the demand for sheep and goat, direct support to farmers in form of training, monitoring and technical assistance to farmers, and the provision of sires, farm infrastructures construction, strengthening organisational and technical capacity group of breeders while introducing elements of contract and organisation of group sales, organisation of vaccination campaign in partnership with private partners and decentralized state institutions.

METHOD

The method that led to the development of the integration process of safety management systems of food safety from the design of small and medium industry in Togo (Lamboni and Azouma,2013) is based on surveys of enterprises already installed that do not produce their raw material. The achievement of the project "ESOP Meat", new business is the real object of experimentation and of validating a new approach. Service enterprises and producer organisations integrate both the production of raw material and its transformation. Taking into account the specificities of the creation of the ESOPs we conducted a study of two rice ESOPs located at Agou and Tchamba and another one of soy based in Notsè (Figure1) using a diagnostic inquiry of FSMS. Also, a survey using a questionnaire on farms allowed collecting information on sheep and goat farms and their equipment, feeding and watering, reproduction and health care of the animals. This investigation focused on 78 family farms sampled using the quota (Gerville-Réache and Couallier, 2011) method for building a representative sample, knowing the distribution of certain characteristics in the parent population (environment and farm infrastructures, herd size). Thus, the 78 farms are constituted by a priori sample which comprises to select individuals that are presumed to hold the information sought (Table 1).

Using the Global Positioning System (GPS), breeding localities, surveyed ESOP institutions visited were geo referenced. From farms monitoring, livestock buildings constructed under the project "ESOP Meat" were examined. Documentary research was conducted in the centre of research on agriculture mechanisation in Togo (CRMAT), at the chamber of commerce and industry of

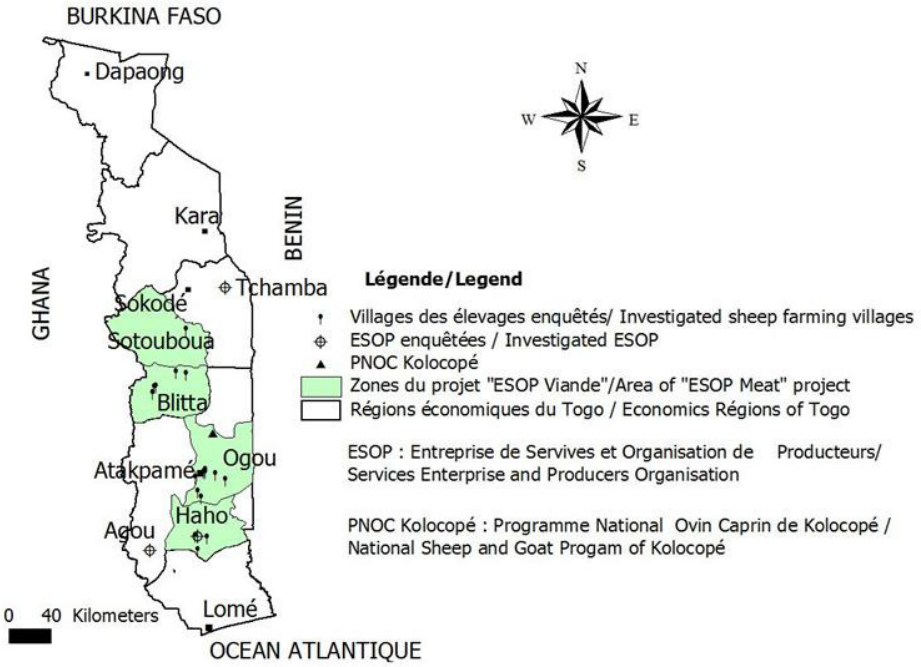

Figure 1. Zones of the Project "ESOP Meat", breedings and institutions of study

Table 1. Distribution of the family breedings surveyed according to the zones

Zones of *« breeding tontine »*	**Number of breeding**	**%**
Haho	36	46
Ogou	20	26
Blitta – Sotouboua	22	28
Total	**78**	**100**

Togo (CCIT), at the livestock management, at the Sheep and Goat Togolese National Program of Agricultural Institute (PNOC-INTRA), at the Egyptian International Centre of Agriculture (EICA), and on internet. Processing and data analysis were carried out with Microsoft Word, Excel and SPSS Statistics software. Finally, a mapping was carried out using Arc-View software.

RESULTS AND DISCUSSION

Compliance Analysis of Surveyed ESOP compared to the Prerequisites of ISO 14000 and ISO 22000

Examination of two “rice ESOP” and one of Soya transformation units compared to the sanitary and environmental prerequisite management standards reveals high rate of non-compliance which varies from 50 to 100% with several categories of prerequisites (Figure 2). The extremely high rate of non-compliance observed concerns the control of cross contamination, the mastery of harmful and waste disposal (ie 100%) owed to the absence of internal quality system approach in the ESOPs (Good Hygienic Practices or GHP, and Good Manufacturing Practices or GMP, HACCP, etc.), the lack of updated scientific information and technical supervision of food safety. (Lamboni and Azouma, 2013; Bahari, 2013). The results of surveys with the ESOP show short comings and constraints on production, marketing and distribution already identified by UNIDO (ONUDI, 2004). On the production plan, the main challenges concern the lack of technical knowledge, the small scale of production, inadequate financing and credit, the lack of modern equipment of production, packaging and labeling the volatility of the firm over time. Under marketing and distribution, the ESOPs are faced with health security image deficit, the high production cost, advertising failure, marketing local support at the distribution or wholesale. These factors are mostly observed during the product’s

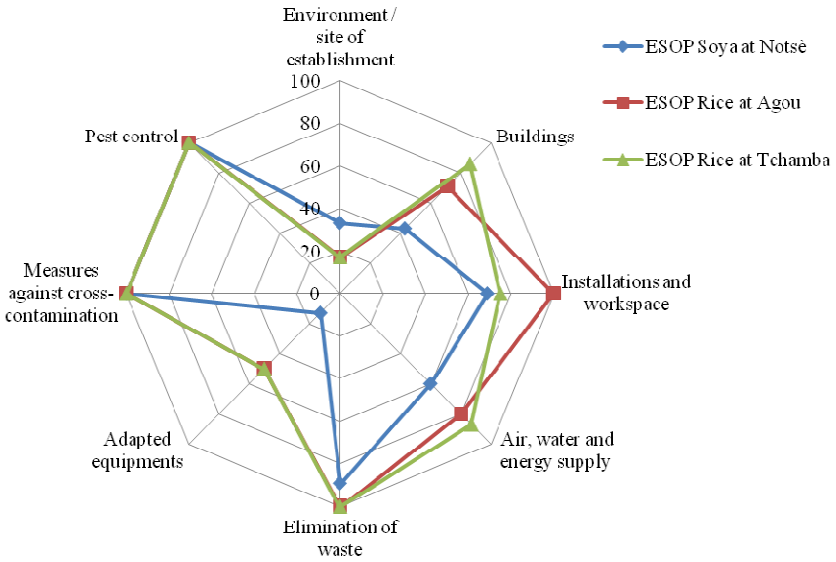

Figure 2. Non conformities by category of requirement in three investigated ESOPs

launching phase, a period marked by the slowness of the growth and the lack of profit.

This situation leads any goodwill to informal business “street product” which generates only survival profits for the producer and an unfair competition for the well-established local companies. All this makes it difficult to consider health and environmental issues for these sectors that combine small family farms with modest processing companies. Meanwhile the state hardly finds its account in such an economic framework. African countries access to the food markets will remain reliant on their ability to observe the regulatory requirements of importing countries and mostly to raise health constraints. These are all issues faced by the project “ESOP Meat” which start to ensure its success especially its durability.

Sanitary and Environmental Constraints of Small Family Livestock Farms

Distribution of herd sizes depending on the species exploited shows 95% confidence; the existence in some localities especially Asrama, Gléi and Akparé significantly higher livestock than others. Apart from these 3 atypical farms, the actual average herd is of 17 ±10 animals. For goats farms, 20 ± 09 for sheep and 21 ±14 for goat and sheep farms. Data analysis of figure 3 shows considerably high variability of the herd size between farms which justifies the need to change and adapt supports (model livestock buildings, farming, inputs and credit instead of proposing uniform solutions to the needs of farmers, “ESOP Meat” project beneficiaries. The survey results show that 5 farms (Figure 3) have a larger size than the others, between 55 and 226 animals. Only three farms (ie 4%) are of the improved traditional type which rigorously practices vaccination against plague of small ruminants and deworming.

Other forms (96%) are traditional and health care is scarce or non-existence. Strong pressure from animal diseases opposes the improved productivity of livestock. Poor farmers haven’t sufficiently benefited from development policy and support in order to promote technological progress and meet the challenges of the sustainable development and poverty reduction (Pradère, 2014). In cattery, food supplementation is scarce and insufficient; free sheep and goat grazing which is fashion becomes important because of the expansion of farms or fields and is a major constraint (FAO, 2009; Poenou and Sedor, 2010). The straying of animals does not make them immune to diseases; it makes them more vulnerable to farm pests, to the plague of small ruminants and other epizooties. The fundamental characteristic of African small farms, namely limited and non-qualified human resources, lack of basis management tools, total lack of planning funded mostly by family capital and often too brief technical supervision and among other difficulties for a proper consideration of environmental and sanitary issues from

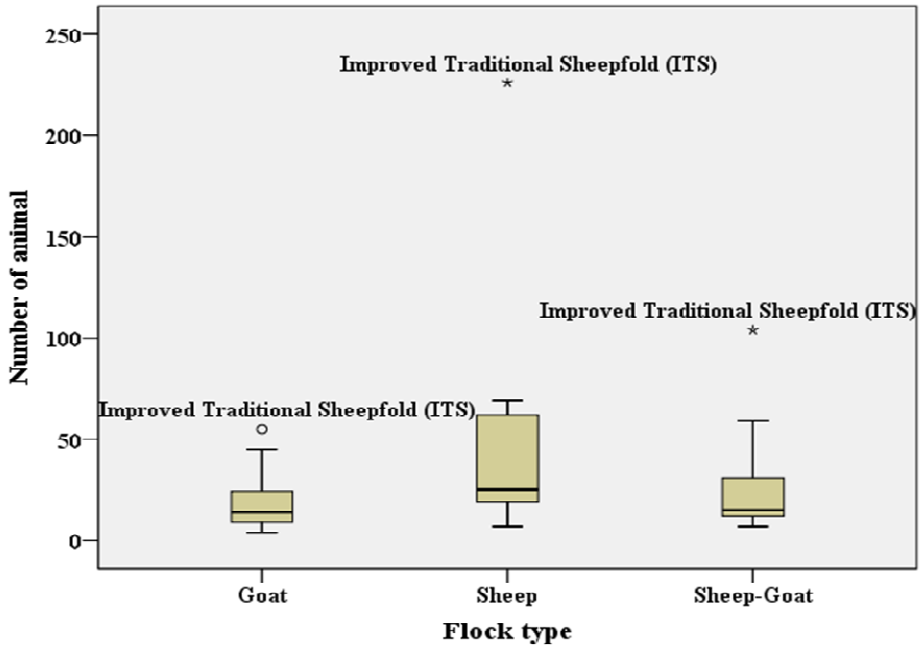

Figure 3. Distribution of the flock strength according to the flock type

primary production which also exists at the level of small and medium food industries (SMFI) (Lamboni and Azouma, 2013; Pradère, 2014). The protection of consumers against present risks all along the food chain from primary producer to consumer, an approach often described as “from farm to fork” or “from farm to the table” requires the cooperation and active participation of all stockholders, especially farmers, factories and consumers in other words an integrated way of operation of all the food chain (Codex Committee on Food Labeling, 1996). Unfortunately, this cooperation and this active participation of the stockholders are not always materialized and where African potential animal products remain of low value partly because of the many sanitary constraints to the smooth running of trade between the states (Mankor, 2013). It is this sad reality of small family farms of developing countries which makes the consideration of health issues difficult. Thanks to the growth of the world economy, liberalization of food trade, the growing demands of consumers and the progress of science and food technology, thanks also to the improvement of the means of transportation and telecommunication international trade of fresh and processed food continue to grow. Thus, creating and maintaining food demand on world markets are based on the confidence shown by importers and consumers regarding the quality of food system (Grunert, 2005; ISO 22000 version 2005; Casewell, 1998; Casewell and Johnson, 1991). As the economy of most African developing countries rely mainly on agricultural production, food protection measures and environmental health play a decisive role both for the improvement of food security and African agricultural GPD (Bahari, 2013). Integration of FSMS from the creation of a SMFI although voluntary in food processing, remains an essential measure to ensure sustainability of ESOP in Togo and essentially for conquering external market. Figure 4 shows that 92% of farms are located among dwellings by third in other words 72 farms out of 78 integrated norms from which only six are isolated. Goat farms are integrated to homes than sheep farms. A situation of farms in houses offers neither possible water drainage nor increases the size of the herd, and worst, ventilation in the barn which confined housing a barrier to bio security standards, environmental requirements in breeding (ISO 14001, version 2004; UEMOA, 2007 and FAO and OIE, 2009).

The examination of farmed infrastructures shows three cases (Figure 5) farms without sheepfold (37%) farms with traditional sheepfold or improved traditional sheepfold (ITS). Housing capacity of traditional sheepfold are generally below normal 0.7m²/ adult animal against 1m²/ recommended for adult animal.

They are poorly ventilated and contains neither contention park nor animal shelters. Despite the existence of many non-conformities, only farms with ITS incorporate some requirements for animal welfare and respect veterinary legislation and environmental requirements (ISO

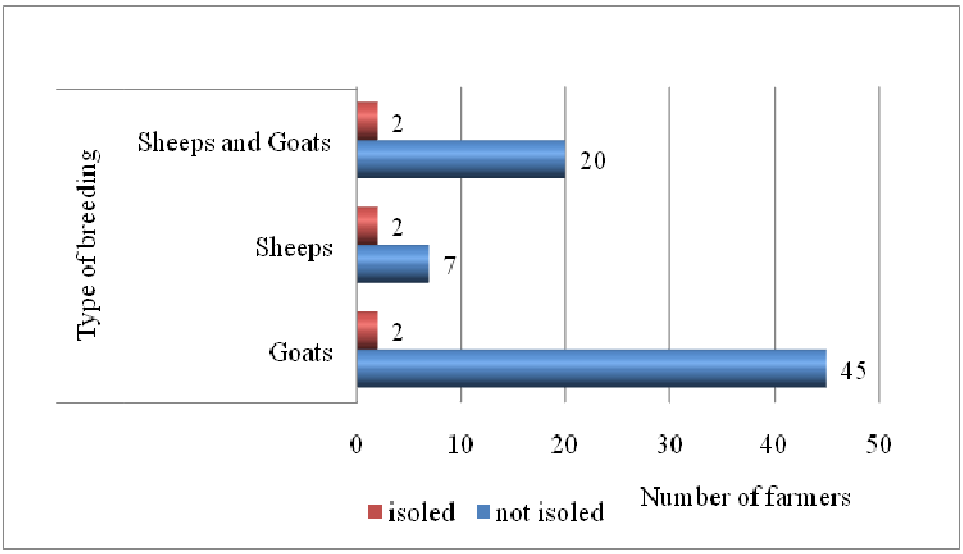

Figure 4. Isolation of the breeding according to the dwelling houses

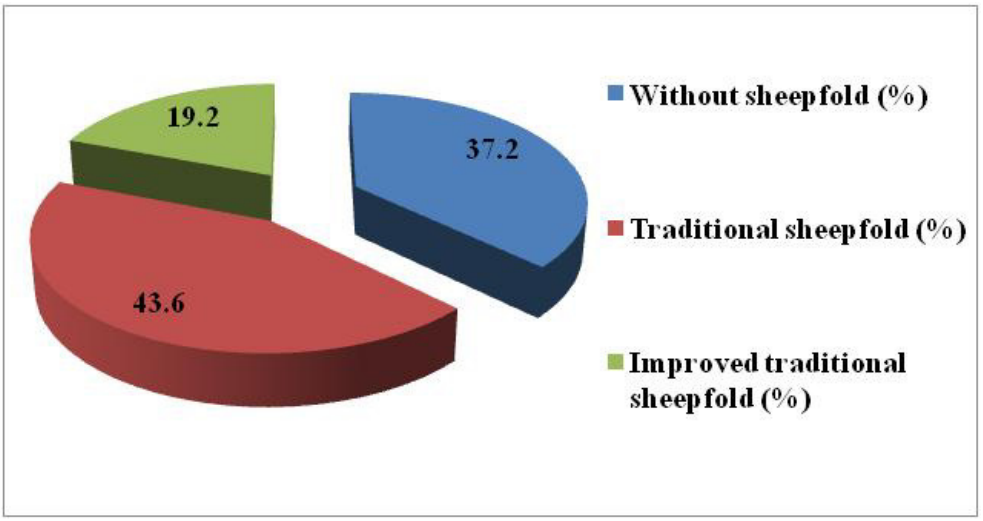

Figure 5. Distribution of the breeders according to the type of sheepfold

22000, version 2005; UEMOA, 2007; FAO and OIE, 2009; Foss, 2011). Table 2 summarizes the main characteristics of the environment and infrastructures of farms compared to standard norms.

Overall, respondent do not include the breeding necessary requirements for animal welfare and food safety (Figures 6 to 8). The main constraints are related to the lack of appropriate equipment in 69.2% of livestock and where are used household utensils such as bucket and basins to serve only drinking water and sometimes food supplements are often distributed on the ground (Figure 9); fodder is served on the ground. Only 3.8% of the livestock have three types of appropriate equipment ie drinking troughs, mangers and racks but still in short supply. The lack of more or less general of troughs and appropriate mangers expose the animals to biological, chemical and physical hazard when they feed and drink from the street (parasites and chemical substances of stagnant waters, plastic bags). As for production, births usually occur at random because the animals are left free in most cases except in improved traditional farms. This situation therefore, affects prolificacy and growth of herd because controlled reproduction is a big advantage for breeders.

Figure 6. Breeding without sheepfold in Blitta

Figure 7. Traditional sheepfold in Notsè

Figure 8. Improved Traditional Sheepfold in Atakpamé

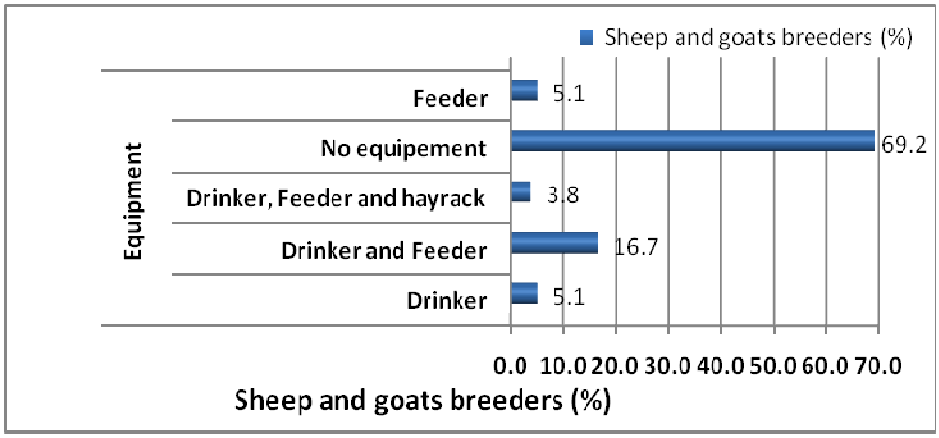

Figure 9. Percentage of the stockbreeders according to the equipments

Table 2. Identification and characterization of the sites and the infrastructures of breeding according to the type of sheepfold (Bonfoh and al, 2007; Gatenby, 1991)

Sites/ Breeding infrastructures	**Quality / Consumer Standards***	**Quality/levelof use**		
		No Sheepfold (NS)	**Traditional Sheepfold (TS)**	**Improved Traditional Sheepfold (ITS)**
Site	Nearby residential space	Not Conform		Conform
	Land with a weak incline, well drained	Not conform		Conform
	Near a waterhole	No water holen early		
Sheepfold	Orientation for best ventilation	Applicable (No pens)	Ignoring orientation of windage	
	Impermeable floor;except integral straw-bottomed area and slope for drainage of liquid effluents		Permeable floor, no slope for drainage of liquid effluents	
	Impermeable walls over the entire height may be contaminated		Permeable walls over full height	
	Wide doors for easy access		Less wide doors	
	Batch housing for category of animal		No batch, except one single case	
	Area: 1 m^2 per adult animal and 0.6 m^2 per animal under 7 months old		surface area < 0,6 m^2/animal	
Contention parks	Area : 3 m^2/animal in cruising period	No park		Absent except in one case
Dunghill	Sufficient capacity	No dunghill		Rarly

The lack of housing and uncontrolled feeding expose animals to gastro-intestinal and microbial infections, especially in the rainy season. This compromises animals 'health safety and animal food origins (FAO and OIE, 2009). Nevertheless, vaccination against the plague of small ruminants is done in improved traditional breeding and only during national campaign for others. The animals are not vaccinated against priority diseases in the list of the World Organization for Animal Health and therefore do not comply with best practices that ensure the safety of food from animal origins (UEMOA, 2007; FAO and OIE, 2009; Bernard and Manuel, 2012).

In order to improve livestock infrastructures, a new model of sheepfold was proposed to farmers as well as equipment and services supplies. Table 3 compares the sheepfold offered to breeders to a standard fold pattern described in 2014 by the National Goat and Sheep Program (PNOC).

Table 3. Comparison of the main characteristics of the model of sheepfold built for farmers with those of the standard sheepfold

Settings / Elements	Features of the sheepfold		Comments on the proposed model
	Proposed model	Standard model	
Dimensions	4m x 5m	No standard dimensions	The proposal does not take into account the actual cruise of various farms
Vital area	18 m^2	Have at least 0.3-0.4 m^2 per young animal and 0.6 m^2 per adult animal in cruise period	Not enough area; this is a limiting factor to increase the number of animal
Maximum capacity	20 heads	Cruise staff	Most breeders exceed the capacity of housing
Contention parks	Absent	Provide 3 m^2 per animal on the basis of the cruise effective for all parks	The absence of contention parks does not allow the detection of disease or nighttime crash animals, affects the mood and health of housing. Animal handling and care for livestock interventions is not facilitated
Dunghill	Absent	Sufficient volume to maintain the manure over a long time before use	Valuation of the manure is impossible without dunghill. Manure is piled around residential spaces or released into the immediate environment of the sheepfold

Table 3. Comparison of the main characteristics of the model of sheepfold built for farmers with those of the standard sheepfold

The comparative analysis of the main features of the ITS model popularized to the standard model slows that the ITS popularized model does not include health and environmental requirements (ISO 14001, version 2004; FAO and OIE, 2009). Considering it takes 1 m² built surface per animal (Gatenby, 1991), the improved sheepfold model with an area of 17.4 m² proposed by "ESOP Meat" Project, can at most, accommodate 20 adult sheeps or goats. On the whole, the herd size in the study area ranges from 4 to 226 smaller farms that do not exceed 25 animals are 63% while the remaining 37% have more than 25 animals. Thus, the popularized fold already raises containment problem for at least 37% of farms and the size of herds increases overtime with the support of "ESOP Meat" Project. The phenomenon could spread to all farms. That factual situation involves major challenges for the sustainability of breeding sheeps and goats and justifies the interest of this research work for the "ESOP Meat" in Togo (Gatenby, 1991; Thays et al., 2013).

Proposal of Integration of safety and environmental Protection sheep and goat farms of the "ESOP Meat" Project

Running a livestock operation requires a broad professional expertise ensuring animal health and quality of animals and animals' products (meat, milk, etc.). This reality is often misunderstood by the general public. This work develops an approach to securing the sheep and goat patterning and environmental protection to enable farmers to improve their practices.

Environmental and Social Compliance

From the stage of preliminary studies of the ESOPs, an environmental and social impact assessment (ESIA) of the Project should be made in order to make possible risks mitigation (OCDE, 1992; ISO 14001, 2004; MERF, 2008). In the process of the selection of breeding, compliance criteria from the production site serve as selection factors. The absence of air and underground pollution and flood risk, the presence of a slight slope on the site, the existence of sufficient area to ensure vital space of at least 3 m² / animal in cruise animal production, proximity to a water source and the habitat of the farmer to protect against theft of animals and existence of access roads in good condition, clean and allowing trucks maneuvers (Gatenby, 1991).

To preserve water resources and environment contamination, they must be stored under the following effluent requirements (Chambrerégionaled' agriculture des Pyrénées Atlantiques, 2010):

- tightness of livestock buildings and measure storage structures and effluents (no direct flow in the area, remediation of contaminated water);
- have storage facilities for livestock manure dimensioned according to regulatory requirements on which operation depends.

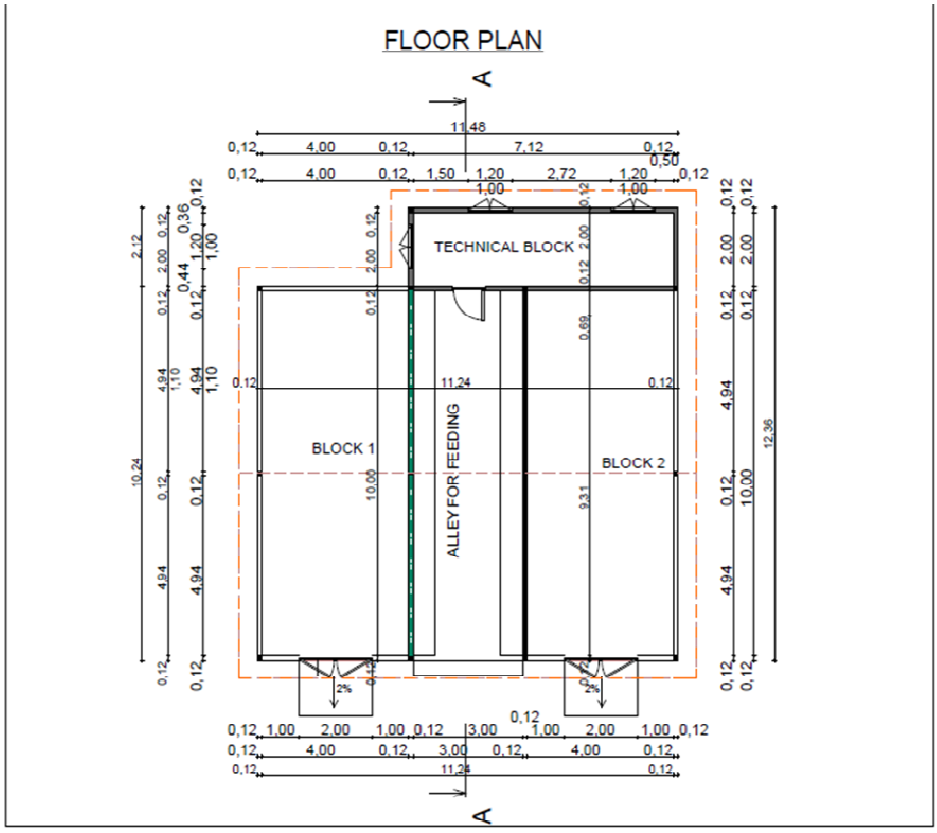

Figure 10: Transverse construction of sheepfold: floor plan

Table 4. Some data on housing of the goats and the sheep (Gatenby, 1991)

Category of age	Surface area (m^2/head)	Length of the feeder (cm/head)
Adultsheep/goat	1.5	40
sheep/kid(7 to 12 months old)	1.0	35
Lamb/kid of (2 to 7 months old)	0.8	30
Ram or goat	2.00	40
Waiting area	0.25 – 0.30	-

Feeding, Watering and Reproduction

Healthy and balanced feeding and quality watering are essential to ensure herd good living conditions, proper health and good production level. To this end, the breeders of the ESOP should provide food that meet the nutritional needs of animals, watering animals with suitable quality water and in sufficient amount without degrading the resource, ensure good hygienic conditions during production, harvesting, storage or distribution of food, trace foods that do not come from the operation in order to trace the origin of any eventual problem.

They ensure the safety of persons and farmers working in the “ESOP Meat” because of the risks of human-animal contact opportunities (handling and restraint, dehorning, buildings).

The welfare of animals which participate to their performances, to their health and to work conditions of farmers, constitutes an important ethical and social issue (FAO and OIE, 2009; Bernard and Manuel, 2012). Farmers of the ESOP should limit sources of stress or injury and

Table 5. Technical specifications of the sheepfolds with parks and indicative costs of building

Parameters	Sheepfold model		
	Large	**Medium**	**Small**
Area of breeding site (m^2)	1200	600	300
Sheepfold dimensions (m)	26 x 10	13 x 10	9 x 10
Sheepfold area (m^2)	240	120	64
Housing capacity of the sheepfold	200	100	50
Number of lots	4	2	1
Compulsory parks	3 parks of reception 1 park of loading 1 park of hindrance 1 «Race» 1 «Crush» 1 dipping-tank 1 draining-board	1 park of loading 1 park of hindrance 1 «Race» 1 «Crush» 1 dipping-tank 1 draining-board	1 park of loading 1 park of hindrance 1 «Race» 1 «Crush» 1 dipping-tank 1 draining-board
Number of alleys for feeding	2	1	1
Number of hayracks	4	2	1
Approximate cost, F CFA*	7 500 000	4 500 000	2 500 000

*the approximate cost is calculated basing on 27 000 F CFA per m^2 covered.

facilitate human-animal relationships or between animals; provide animals with proper living conditions and meadows.

Reproduction must be monitored in order to avoid crossing with related subjects and inbreeding. The male parents must come exclusively from the centre of selecting National Goat and Sheep Program based in Kolocopé. The sex-ratio to be respected is 1 male for 25 females. The infertile females are not kept for reproduction, the same for those that have malformations.

Animal Identification and Health Care

Animal traceability is a key issue for human and animal health. If the animals are identified and traced, we can find them, or find the products made from it in case of health Having healthy animals can avoid the contagion between animals and humans, but also of sold goods. Healthy animals are also guarantee of a more efficient herd, less expensive and easier to manage. In the case of animal health (République du Togo, 1999; UEMOA, 2007; FAO and OIE, 2009 and ACIA, 2013) the breeder of the ESOP should: meet sanitary requirements; monitor the health of their animals and treat them if necessary, with the support of his vet; holding his own facilities and ensure the traceability of veterinary treatments retaining the prescriptions and noting the treatments performed in a sanitary card.

Livestock buildings and equipment

The rearing houses of sheeps and goats are diverse, every type of building suits a given situation, and possesses advantages and inconveniences. Because of the problem. An updated identification is also useful to the technical management of the herd. Therefore, the ESOP breeders have the responsibility to ensure accordance with the charter of good animal husbandry practices the following tasks with technical and financial support of the ETD (Bernard and Manuel, 2012):

- the closure of lambs at least one ear, within 45 days (60 days maximum) after birth;
- monitoring this closure with the order and the replacement of lost or illegible loops;
- notification within 7 days and in detail of all the events (births, inputs, outputs);
- verification and strict ranking of all identification documents.

comparative advantages (possibility of extension, longevity, speed in the service), the transverse construction (Figure 10) is proposed to serve as standard sheepfold of sustainable fattening sheep and goats. Tables 4 and 5 specify technical data and further information of conception and equipment of three models of sheepfold of transverse construction: small, medium and a large sheepfold. Every breeder of an “ESOP Meat” will choose the capacity of his sheepfold according to his means.

CONCLUSION

Surveys of a sample of 78 flocks of sheep and goats “ESOP Meat” creation in Togo led to distinguish three types of farming: farms without building, farms with traditional buildings and finally farms with improved traditional building in respective proportions of 37%, 44%

and 19%. Depending on the distance between farm buildings and homes, results indicate that 92% of farms are in farmers' houses, a thing which is an environmental non-compliance. Animals' behaviour is also characterized by the wandering of animals in the vast majority of cases, the restraint of animals for cultivation time using ropes, lack of infrastructures and livestock equipment, insufficient food supplements and the lack or total absence according to individual case of health monitoring.

To improve livestock conditions, a new model of sheep or goat breeding has been proposed for the implementation of the "ESOP Meat". But also, ignored prerequisites related to health and environmental standards and regulations. In order to ensure sustainable development of the "ESOP Meat", this research proposes an approach for integrating health safety and environmental protection in small and medium sheep and goat farms.

ACKNOWLEDGMENTS

The authors thank sheep and goat breeders and the NGO "ETD" staff for their assistance in gathering information. Thanks also to the programme WAAPP/PPAAO-Togo for their financial support.

REFERENCES

ACIA (Agence canadienne d'inspection des aliments) (2013). *Biosécurité animale. Norme nationale de biosécurité à la ferme pour mouton*, ACIA P0847F-13 No de catalogue : A104-111/2013F ISBN : 978-1-100-21857-1, 48p.

Bahari MM (2013). L'importance d'intégrer le bien-être animal, la santé environnementale et la législation vétérinaire à l'amélioration de la sécurité alimentaire et la contribution au produit intérieur brut de l'Afrique. In : OIE, eds. 20ème *Conférence régionale de l'Organisation mondiale de la santé animale (OIE) pour l'Afrique*. Lomé, Togo, 18 au 23 février 2013 pp 144-155.

Bernard M, Manuel G (2012). *Charte des Bonnes Pratiques d'Élevage*, 17 p.

Bonfoh B, Kponmassi T, Gamado A, Ayewa T (2007). *Rapports annuels d'activité du Programme National Ovins-Caprins* 1999 à 2005. Kolocopé : Centre de Recherche Agronomique – Savane Humide de l'Institut Togolais de la Recherche Agronomique.

Caswell AJ (1998). How Labeling of Safety and Process Attributes Affects Markets for Food. In: *Food Safety and Process Labeling*. Agricultural and Resource Economics Review pp. 151-158. Massachusetts, Amherst.

Caswell JA, Johnson GV (1991). Firm Strategic Response to Food Safety and Nutrition Regulation. In: *Economics of Food Safety*, ed. Julie A. Caswell, pp. 273– 97. New York: Elsevier Science Publishing Co.

Chambre régionale d'agriculture des Pyrénées Atlantiques, (2010). *Mise en conformité des bâtiments d'élevage aux normes environnementales*. France, 7 p.

Codex Committee on Food Labeling (CCFL), (1996). Draft Guidelines for the Production, Processing, Labeling, and Marketing of Organically Produced Foods, CL 1996123-FL, Rome, Italy, June.

CTA (Centre technique de coopération agricole et rurale), (2006). *Élevage des caprins, Fiche Technique*. Programme de radio rurale – *06/2*. Paris

DSID(Direction des Statistiques Agricoles l'Informatique et de la Documentation), eds, (2013). *Recensement Nationale de l'Agriculture 2011-2014.* Volume 1. Module de base : aperçu général de l'agriculture togolaise. Lomé : Ministère de l'agriculture, de l'élevage et de la pêche.

ETD (Entreprise Territoire et Développement), (2012). *Mise en œuvre du Programme d'appui à la productivité agricole en Afrique de l'ouest-projet Togo. Axe ESOP : filières semence et viande. Offre technique présenté par ETD*, version définitive, 24p.

FAO (Organisation des Nations Unies pour l'agriculture et l'alimentation), (2009). *Revue du secteur élevage au Togo (Bétail / Viande et Lait)*. Lomé : FAO

FAO et OIE, (Organisation des Nations Unies pour l'agriculture et l'alimentation et Organisation mondiale de la santé animale), (2009). *Guide des bonnes pratiques d'élevage visant à assurer la sécurité sanitaire des denrées d'origine animale.* Rome : FAO.

Foss JL (2011). *Acteur en élevage laitier, J'analyse, j'agis. Bâtiments équipements d'élevage. Agriculteurs et Territoires. Fiches d'aide à la décision*. Chambre d'agriculture de Bretagnes, 24 p.

Gatenby RM (1991). *Le Mouton, volume 2*. Maisonneuve et Larose. Le Technicien d'agriculture tropicale N^0 23. Paris : Press Ltd, 1991ISBN : 2-7068-1100-5 et 92-9028-209-6.

Gerville-Réache L, Couallier V (2011). *Echantillon représentatif d'une population finie : définition statistique et propriétés. Echantillon représentatif, Sondage, Quotas, Probabilités d'inclusion.* 2011. <hal-00655566> 12 p.

Grunert GK (2005). Food quality and safety: consumer perception and demand. In: *Food Safety and Process Labeling.* European Review of Agricultural Economics Vol 32 (3) (2005) pp. 369–391 doi:10.1093/eurrag/jbi011

ISO (International Standard Organisation) 14001, (2004). *Systèmes de management environnemental. Exigences et lignes directrices pour son utilisation***.** Suisse.

ISO (International Standard Organisation) 22 000, 2005. *Association Française de Normalisation. NF EN ISO 22 000, Systèmes de management de la sécurité des denrées alimentaires. Exigences pour tout organisme appartenant à la chaîne alimentaire*. La Plaine Saint-Denis : AFNOR.

ISO (International Standard Organisation) 9001, (2008). *Association Française de Normalisation. NF EN ISO 9001*, *Systèmes de management de la qualité. Exigences*. La Plaine Saint-Denis : AFNOR.

Lamboni M, Azouma OY (2013). Intégration du système de gestion de la sécurité des denrées alimentaires dès la conception d'une petite et moyenne industrie au Togo. *Environ Risque Sante* 2013 ; 12 : 521-9 doi : 10.1684/ers.2013.0658.

Mankor A (2013). Promouvoir le commerce interafricain des animaux et des produits d'origine animale. In : OIE eds. 20ème *Conférence régionale de l'Organisation mondiale de la santé animale (OIE) pour l'Afrique*. Lomé, Togo, 18 au 23 février 2013 pp 11-16.

MERF (Ministère de l'Environnement et des Ressources Forestières), (2008). *Loi-cadre sur l'environnement du Togo*. République du Togo.

OCDE (Organisation de Coopération et de Développement Economiques), (1992). *Bonnes pratiques pour les études de l'impact sur l'environnement exercé par les projets de développement. Comité d'aide au développement, Lignes directrice sur l'environnement et l'aide n°1*, Paris, 18 p.

ONUDI (Organisation des Nations Unies pour le Développement Industriel), eds, (2004). *Mise en valeur des productions agroalimentaires de l'UEMOA*. Cas de la *"filière viande bovine" du Niger. Vienne : ONUDI.*

Poenou KV, Sedor YA (2010). Etude de faisabilité de promotion de l'élevage familial au Togo. ETD, Lomé Togo.

Pradère JP (2014). Liens élevage-environnement-développement durable. *Rev. sci. tech. Off. int. Epiz.*, 2014, 33 (3), 745-763.

République du Togo, (1999). *LOI No 99-002 du 12 février 1999 relatives à la police sanitaire des animaux sur le territoire de la République togolaise*.

Thays Mayra da Cunha Leme, Evaldo Antonio Lencioni Tittoa, Cristiane Gonc¸ alves Tittoa, Alfredo Manuel Franco Pereira, Marcos Chiquitelli Neto, (2013). Influence of stocking density on weight gain and behavior of feedlot lambs, *Small Ruminant Research*115 (2013) 1–6.

UEMOA (Union Economique et Monétaire Ouest Africaine), (2007). *Règlement n°7/2007/CM/UEMOA relatif à la Sécurité sanitaire des végétaux, des animaux et des aliments*. Lomé.