Characterization of the Surface Used in TwoTraditional Corrals of Goats and their Costs in the Mixteca Poblana, Mexico

Jorge Ezequiel Hernández Hernández, José del Carmen Rodríguez Castillo, José Manuel, Robles Robles, Francisco Javier Franco Guerra, Elizabeth Pérez Ruiz and Elsa Lysbet Rodríguez Castañeda
Group of Researchers of the Faculty of Veterinary Medicine and Zootecny-BUAP, Mexico
ovichiv_05@yahoo.com

Abstract

The surface in the goat facilities is basic for the development and welfare of the goats; maintains in the production unit space for your comfort and productive well-being, the MixtecaPoblana conserves important caprine population installed in traditional corrals without defining the square / animal squares in its production phases. Study conducted in Maninalcingo and Tehuaxtla in the Mixteca region south of the state of Puebla in Mexico. Objective: identify the area used in two traditional corrals of goats and their costs in the MixtecaPoblana, Mexico. One corral per community was used, applying an estimation matrix with intrinsic components (ICEM). The data was processed with the SPSS 10.0 program for Windows. The results showed a total area of 76 m^2 for Tehuaxtla corral and 60 m^2 for Maninalcingo corral, with respect to goats' productive phases, the Tehuaxtla corral with (46) bellies, sires (2) and goatlings (12); Maninalcingo threw the same productive phases with (38) bellies, (2) sires and (14) goatlings. In its costs for traditional corral, Tehuaxtla made an investment of $ 4,550.00 (240.7USD) and Maninalcingo of $ 3,350.00 (177.2USD) which represented 16% less for having a decrease in square meters in its corral.

Keywords: Accommodation, goats, production, welfare, corrals.

1.Introduction

The importance of the surface managed in the corrals for goats, plays a fundamental role for the development and welfare of these small ruminants; for this reason, buildings and facilities must be designed with a level of foundation and conservation, in such a way that it supports minimizing the risks of injury or anguish without predisposing animals to diseases, such as goats because of their active and vigorous temperament natural in any production system (López*et al.,* 2008).The corrals or traditional shelters of shelter and confinement, will have enough space to move easily, without causing damage or physiological changes (temperature or alterations in their constants) that can reduce their productive activity (Giorgis*et al*., 2011).

The surface or space of a corral, is a basic element within the production unit because it maintains the dynamic integrity of the goat herd for better zootechnical performance (SDR, 2007). It should be considered that the surface or vital space in the productive unit of the goats, will maintain a dimensional status in relationship with the different phases of production; that is, the place will have the number of square meters according to the coexistence of the type of animal, in the production cell (Forcada, 2006). The surface or area will have flexibility for future expansions (spaces), which allow the incorporation of new technologies in the unit goat production and other small ruminants (Hernández *et al*., 2007).

The size of the pen will depend on the space available per animal, as well as the total area suitable for all goats and the extension of the group (López*et al*., 2008), this must be calculated according to age, size and other natural characteristics of these small ruminants; since the behaviors and functions are completely different, being the case, where the sheep acts in a gregarious manner manifesting greater approach, tolerance between individuals unlike goats (Hernández *et al*., 2007). In such a way, that the relationship that must exist between the farm or the production unit, is dependent on the system of production, zootechnical purpose, idiosyncrasy of the producer, animal and environment (Gallego, 2006; Forcada, 2006), this way your complexity of the installation in relation to the pen or space will be categorically determined.

Some authors such as López*et al*. (2008), determine that both sheep and goats that are housed in the available space per animal, as well as the total useful area for all animals and the size of the group, should be calculated based on age, size, species and other characteristics. of the individual (Angón*et al*., 2013). Essential aspect to be considered; since in the case of the MixtecaPoblanapogeneral, goats require a greater physical surface and shelter due to the silvopastoral conditions of the Mixteca region of Puebla, where the environment influences, threatens by predators and the socioeconomic environment (Hernández, 2006).

2. Objective

The objective of the work was to: identify the surface used in two traditional corrals of goats and their costs in the MixtecaPoblana, Mexico.

3. Materials and method

3.1 Place of study

Study carried out in the communities of Maninalcingo and Tehuaxtla belonging to the municipality of Piaxtla, in the MixtecaPoblana; region located south of the state of Puebla in Mexico, its geographic coordinates are 17 ° 59'00 "18 ° 12' 30" parallel north latitude, and the meridians 98 ° 10' 54 "98 ° 21' 36" western longitude (Inegi, 2000). The site present rugged terrain and altitude of 1180 msnm. The hydrography is given by the high region of the basin of the Balsas river, where its flora is represented by low deciduous and spiny deciduous forest, scrub with izotes and arboreal-shrubby; the climate is warm subhumid, with rains in summer and very warm semi-dry with rainfall between 350 to 800 mm with an average annual temperature of 23 ° C (Inegi, 2000).

3.2 Methodology of the study

Two corrals were used for goats, one for each community, where an own matrix was applied per unit of production, known asICEM (estimation matrix with intrinsic components), which synthesized and calculated the strengths and weaknesses defined in the study (See Figure 1): number of animals, productive phase of the goat, breed, age, sex, parts that make up the corral (water troughs, feeders, salt shakers and shade), square meters / corral and costs / total surface.
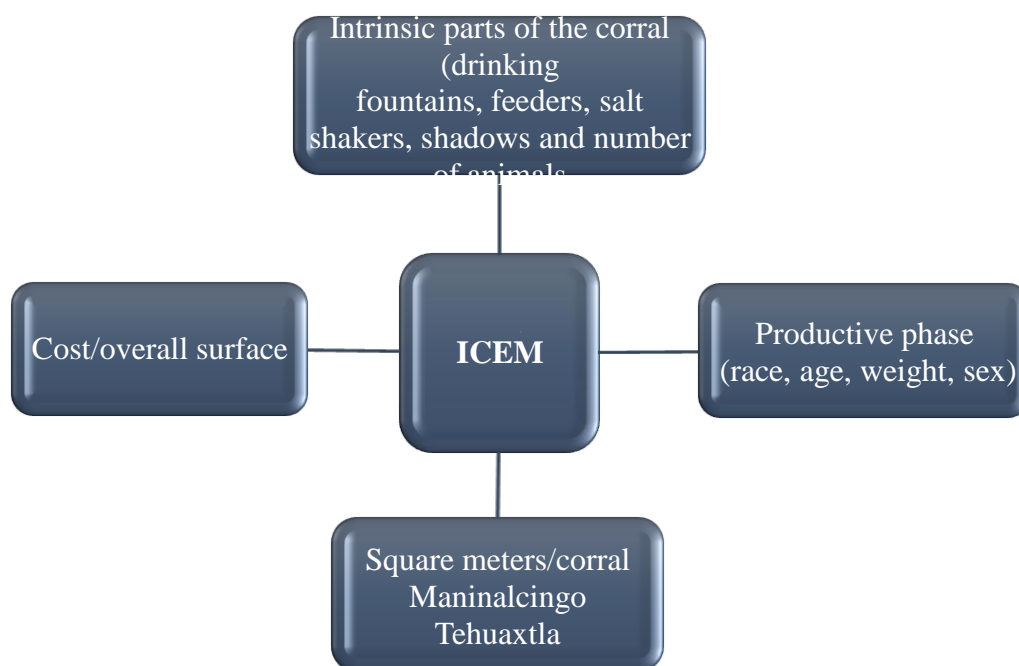

Figure 1. Matrix considered to the production units of Maninalcingo and Tehuaxtla

All the information that the matrix concentrated was compiled by data provided by the producer of each corral, and this matrix was applied in the form of a questionnaire-type interview (Pardinas, 2005).The linear measurements were made through a 25 m flexometer in each corral and for parts that constituted it.

Later a digital calculator was used to quantify the square meters obtained / corral included in the survey work.With respect to the costs of the total area, it was estimated with

values (prices) considered by the producers of both pens, and according to the value of materials of the study time. The study covered the months of September 2011 to January 2012), the data was concentrated in Microsoft Office Word 2013 and Microsoft Office Excel 2013 programs; to later process them with descriptive statistics, using the SPSS 10.0 package for Windows.

4. Results and discussion

The matrix designed and applied to the two corrals (accommodations) in relation to the surface, gives us a important information with regard to species present in its pen, number of animals, phases productive of the goat, parts that counts the corral, age of the goat, among others (Table 1).

Table 1. Indicators considered in the matrix applied to the corrals of Maninalcingo and Tehuaxtla in the MixtecaPoblana of Mexico

Name of thelodges	Speciesfound in thelodges	Number of animals	Productionphase of thegoat B = bellies S = sires G= goatlings	Partsthatcountsthe corral	Surface of theyard m^2
Corral Tehuaxtla	Goats	60	B=46 S=2 G=12	Drinker and saltshaker	76
Corral Maninalcingo	Goats	54	B=38 S=2 G=14	Drinker, feeder and saltshaker	60

The color of the letter corresponds to the productive phase in which the goats were in both corrals.

It is important to indicate, that species such as bovines and sheep present in the pens of study, influenced the living space of the goats installed in said corrals; as shown in table (1), where number of animals, surface size, breeding preference and parts such as drinking troughs, feeders, salt shakers present in those production units, are indicators that affect the surface for the welfare and productivity of the goats of that Mixteca region; Similary results are found by López*et al*. (2008) and Soberón (2001), establishing that animal welfare depends a lot on good productive management; especially in relation to the surface that can be given in m^2 / goat in the corrals, decreasing the stress for occupational space that it shares with other species of greater size in a general way in the corrals used in a production system.In such a way, that the characteristics of the corral should promote animal welfare; since this, will have a total area with respect to the construction volumes available to goats, ie the number of goats in relation to their age, weight, diet, drink and bed space (Aha, 2016; García*et al*., 2018).

The surface of the pen with respect to the square meters per animal was variable and very small, since in the case of the Tehuaxtla corral they reached a space of 1.2 m^2 / goat, for the Maninalcingo pen, their space was 1.1m^2 / goat; consequently, both pens presented low total area according to the population of goats existing in the study, these results are general without being calculated by productive phase or age of the goats. This is different from what is referenced by Aha (2013), when establishing 1.7 m^2 / adult, kids of up to 5 months with a

space of 0.7 to 0.9 m^2 and goat with space of 2.8 to 3.7 m^2.Regarding shade, the results to square meters or parts of the pen are minimal; reaching just less than half a quarter of the corral, and far below the roof where it reached a height of 1.65 m^2, different from the recommended by Giofredo and Petryna (2010), where they establish that the roofed sector must at least reach a minimum height of 2.20 m in said space to provide comfort and well-being of the animal confined to that surface.

Authors such as Lópezet al. (2008), establish that it is essential to include the feeders, drinking troughs, salt cellars, sun decks and shading in the corrals; since of not considering them, the vital space would reduce the potential in the development and functionality in the exploitation of the goats; in addition, to be fictitious in a good productive development and animal welfare in any production unit, whether family, business, governmental or private; due to the low productivity and profitability indexes when marketing these goats (Cofré, 2001).

In relation to the table (1), we can highlight in terms of m2 / corral, the Tehuaxtla corral maintains a greater area of m2 with 76; however, they are not sufficient and adequate for a large number of goat population in the pen. In such a way, that it is essential to have m2 in relation to the number of goats to be reared and by productive phases; besides giving the goats less competition to acquire food, surface to rest and less stress due to overcrowding that restricts their health and animal welfare (Ronchi and Nardone, 2003).

Table (2) shows the means and standard deviations of other indicators integrated into the matrix of the corrals under study in the Mixteca region

Indicators	Corral Tehuaxtla	Corral Maninalcingo	Mean	± SD
Goats	60	54	**57**	± 2.8
Bellies (goats)	46	38	32	± 8.4
Sires (goats)	2	2	2	___
Goatlings	12	14	12	± 2.1
m^2 / corral	76	60	68	**± 11.3**

The statistical mean in relation to the two corrals studied, show an average of 57 goats in total to the number of the general goat population; with respect to the standard deviation, a similarity is observed in the number of goats and the number of square meters in their total area of each pen with ± 11.3 percent. Which space is not viable for their productive development and animal welfare, due to the overcrowding factor of the goats in both corrals of that Mixteca region.

Principle supported by Forcada (2006) and (Hernández et al., 2007), considering that health is compromised (incidence of internal parasitosis, respiratory problems among other diseases) by determining or associated factors present in the goat lodgings; which is recommended at least a space of 1.5 to 2 m^2 / adult goat in general corrals or non-technified;

similar aspect determines Succin (2003), by stating that the construction of the facilities (general corrals) present in traditional and open systems, the area destined for adult animals will be from 1.5 to 2 m^2, and in the case of the offspring they must have a space of at least 0.5 m^2 / goatling.

Finally, with respect to the costs incurred for the construction of traditional corrals in the exploitation of goats in the MixtecaPoblana de Mexico; they are extremely economic, since these prices generated by the producers are shown in the table (3).

Table 3. Traditional corral costs of Tehuaxtla and Maninalcingo for the production of goats in the MixtecaPoblana of Mexico

Concept	Type of material Corral Tehuaxtla	Type of material Corral Maninalcingo	Corral cost Tehuaxtla	Corral costManinalcingo
Enclosurecorrals Shading	Mesh	Meshwithwood Oilsheetwithgalvanized	$2,300.00	$1,650.00
	Zinc sheet (30%) of the total surface	(30%) of the total surface	$1,200.00	$800.00
Drinkers Salt shakers	Concrete	Concrete Concrete		
Maintenance of corrals	Concrete Nails, wire, workforce	Nails, wire, workforce	$250.00 $200.00 $600.00	$250.00 $200.00 $450.00
Total de costos			$4,550.00 MX (240.7USD)	$3,350.00 MX (177.2USD)

The difference of the costs of corral is $ 1,250.00 (66.1 USD) in favor of the lodging Maninalcingo, and this corresponds to the type of material, considered surface, parts that integrate the corral, manpower and even the goat population and productive phase that presents each corral constructed; This principle is similar to what Forcada (2006) and (Hernández *et al*., 2007) support, considering that housing costs are an intrinsic indicator of the accommodation that supports any production system, whether traditional or otherwise. type in these small ruminants. Figure (2) shows the percentage of cost / corral considered in this study; which is 16% less for the Maninalcingo corral.
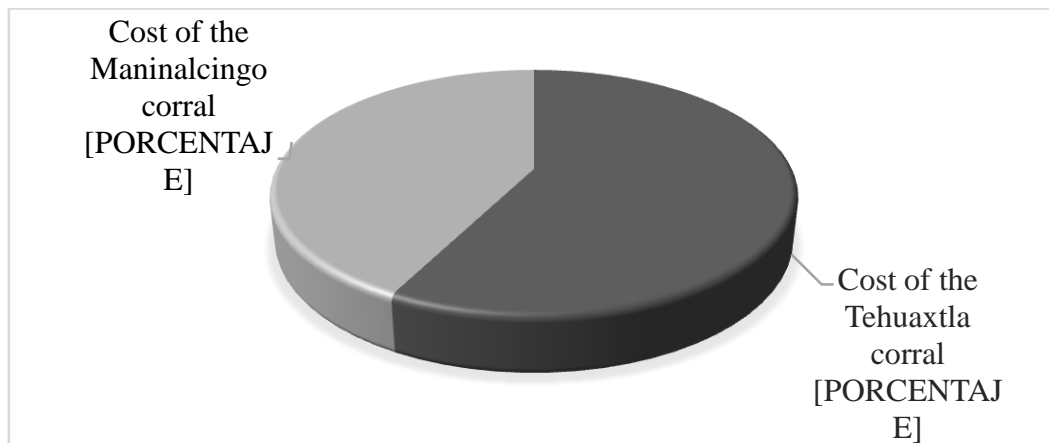
Figure 2. Estimated cost of one hundred percent of the total areas considered for the construction of the corrals in the MixtecaPoblana

5. Conclusions and Recomendations

1. The producer profiles its surface to the raising or exploitation of goats, where the space considered inside the pens in their production units and their aforementioned total area of both pens is not enough; since said total surface, it must be a physical element that harmonizes the good functioning in the productive development and well-being of its goats of comfortable form.

2. As far as corrals, you should consider the parts that make up these (drinkers, feeders, salt shakers, shade among others), since the space will be greater when including them and not considering the m^2 inside the total population of the goats on its surface total, which is advisable to increase 18% of the area they have; being still traditional corrals in that region of the MixtecaPoblana of Mexico.

3. The m^2 / goat will be considered in relation to the productive phases that are taken in the caprine unit, it would be advisable to at least think of a space inside the corral to separate goatlings, bellies, sick animals and sires in emergent moments that present the production unit.

4. The MixtecaPoblana, has producers of low economic resources to invest in special accommodations; however, they have a great potential of natural resources that can reduce costs for construction and give a better animal and productive welfare, if at least 2 m^2 / animal is considered.

References

Angón, E.,Perea, J.M.,Valerio, D., García, A., Acero, R., &Toro-Mújica, P. (2013). Caprinefarms in northwestregion of DominicanRepublic: typologiesaccording to livestockmanagement and economic variables. ScientificMagazine, 23 (2), 139-149.

Cofré, B.P. (2001). Production of dairygoats. AgriculturalResearchInstitute. INIA Bulletin, edition (66). Chillán, Chile.

Forcada, F. (2006). Animal Production and VeterinaryHygiene: AccommodationforSheepCattle. Conference. University of Zaragoza, Spain. 2006.

Gallego, B.A. (2006). Thesheep and goats in organicproduction. (1ªed). Andalucia, España: AssociationfortheSustainableDevelopment of the West Granadino, (Chapter 1).

García, B.V., Vargas, L.S., Bustamante-González, A., Torres-Hernández, G., Calderón, S.F.& Olvera-Hernández, I. (2018). GoatProductionforMeatthe Mountain of Guerrero, México. Agriculture, Society and Development, (15), 1-17.

Giorgis, A., Perea, J., García, A., Gomez-Castro, G., Angón, E. &Larrea, A. (2011).Technical-economiccharacterizationand typology of dairyfarms in thePampa (Argentina).Scientific Magazine, 21(4), 340-352.

Gioffredo, J. & A. Petryna. 2010.Caprines: General, Nutrition, Reproduction and Installations. Cathedra of Sheep and GoatProduction. ArgentineSite of Animal Production.1-20.

Hernández, H.J.E. (2006). Assessment of theCaprinocultura in the Mixteca Poblana: socio-economics and arboreal-shrublandresources. Doctoral thesis. Faculty of agriculturalsciences, Camagüey University, Cuba.

Hernández, H. J. E., Franco, G. F. J., Villarreal., E.O.A., &Arroyo, S. (2007).Main causes of mortality in threesheepproductionunitsundersilvopastoralconditions of the Mixteca Poblana.Memories in CD-RW, II Congress of Animal Production, 1st International RuminantProductionSymposium. 26-29 de november 2007, ICA. La Habana, Cuba. 53-57.

Inegi. 2000. Geographicsynthesis of thestate of Puebla. (2ªed). Ebook, Mexico: NationalInstitute of Geography and InformaticsStatistics, (Chapter, 2).

López, M.R., Atencio, R.A., &Dubaterre, R. (2008). Constructions and Installations in theProduction of Sheep and Goats. Basic Principles. Scientific Magazine, (24): 23-27.

Pardinas, F. (2005). Methodology and techniques of social scienceresearch. (1ªed), México: Siglo XXI, (Chapter, 3).

Ronchi, B., &Nardone,A. (2003). Contribution of organicfarming to increasesustainability of Mediterraneansmallruminantslivestocksystems. LivestockProductionScience, (80): 17-31.

SDR. (2007). Programs and Components of the General Directorate of Supportfor Rural Development, MainResults. Undersecretary of Rural Development. SAGARPA, México.

Soberon, A.M. (2001). Behavior of Goats. Notes of AppliedEthology. Department of ethology, wildlife and laboratoryanimals.NationalAutonomousUniversity of Mexico, UNAM, Mexico, City.

Sucin, M. (2003). TheBreeding of Goats.CaprineDevelopmentProgram, Chaqueño. ArgentineVeterinary, 20 (192): 29 35.

Aha. (2016). AustralianIndustryWelfare Standard and GuidelineforGoats. (1ªed), Australia: Animal Health Australia, (Chapter, 4).