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Morphometric Characterization of Creole Sheep without Ear of the Sierra North State of Puebla-Mexico

Hernández Israel[1*], Rodríguez J. Victor[1], Romero Omar[3], Hernández J. Santos[2], Macías Antonio[1], López Higuinio[1] Herrera J. Guadalupe[1]

[1]Colegio de Pos-graduados *Campus* Puebla, MÉXICO
[2]Instituto de Ciencias de la Benemérita Universidad Autónoma de Puebla, MÉXICO
[3]Centro de Agroecologia del Instituto de Ciencias de la Benemérita Universidad Autónoma de Puebla, MÉXICO

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Abstract

Different animal breeds characterization, helps identify a population with unique features that differentiate it from others. For this reason, it is necessary for the conservation of these resources through programs of identification, characterization and genetic conservation, thus preventing the extinction of local breeds. The aim of this study is to characterize phenotypically Creole sheep without ears and typify the production system where it grows. This work was performed in three municipalities of the Sierra Norte of Puebla (Zacatlán, Cuautempan and Tetela de Ocampo), involves three stages i. phenotypic characterization, ii. characterization of the production system and iii. data analysis. 11 Zoometric indices and 14 morphometric measurements were explored. For the characterization of the production system, these components were considered, productive, economic, agricultural, social and ranchers. Data were transported to Excel spreadsheets for analysis in the statistical program SAS. In morphological variables is seen a straight profile in 66% of the cases analyzed, the rest present a convex profile, the type of udder is globose by 64%. Sheep have a PV of 30.78 ± 5.76 kg in females and 28.33 ± 6.31 kg in males. The ALC of 51.80 ± 4.86 cm in females, female AG 54.29 ± 5.19 and 52.08 in male ± 5.16 cm. With respect to the indices was observed ethnological an ICE of 57.30 cm to 57.05 cm IPE ICO of 80.64 cm. For there is a functional indices of IPRO 107.45 cm to 58.47 cm one IPRP the IPEL of 34.74 cm. The animals are raised by older farmers between 55.71 ± 13.97 years with experience in the care of these animals 26.02 ± 14.12 years and have surfaces below one hectare property. The Creole sheep without ears is a small animal with harmonious proportions, has a straight profile, medium-length neck and slightly muscular trunk is proportional to the size of the animal with narrow thorax and small udder, the limbs are thin, naked and well plumb. Producers are speaking Nahuatl and Totonac devoid of financial and technological capital and consider its production as a means of saving.

Keywords: Genetic, creole, without ears, sheep native breeds.

Introduction

Currently sheep production is constantly increasing due to the nutritional and organoleptic characteristics of the meat. For this reason, sheep production is emerging as an alternative to improve the lives of small and medium producers of sheep for slaughter[1]. In recent decades has occurred in Mexico influx of sheep from Australia, New Zealand, Oceania, Canada and the United States of America. Be imported exotic genetic types to be sold as breeding stock or frozen meat for consumption. Production systems specialized sheep (meat), kept their flocks under very favorable conditions of food, health and housing, which is very different from traditional sheep farming. It seems obvious that these exotic animals cannot survive in conditions where the native cattle do it regularly[2]. The system of sheep production in the Sierra Norte of Puebla-Mexico is characterized as traditional. Where, women and children play an important role in the production of this species. The sheep production system is defined largely by the absence of other medical practices, nutritional and reproductive. The herds are generally hand led by low-income producers, considering this production savings in emerging situations[3]. In seeking to improve the situation of small producers of sheep in the state of Puebla, have implemented development programs aimed at replenishing herds. To achieve this, they have introduced purebred animals, as well as implementation of modern technologies.

All this, without regard for any form of loss or adapted native genetic resources. Moreover, without taking into account the purchasing power of producers to meet the needs that require exotic genetic types. The introduction of sheep breeds, has been in most cases by stallions and without following a defined set of crosses, leaving animals with a genetic makeup in varying degrees of absorption, and in other cases the multiracial composition is not defined. Another factor influencing the wear of local genetic resources is the high degree of inbreeding that occurs in closed populations, causing the loss of genes characteristic of native sheep populations. These genes are of extreme importance in animal breeding programs[4]. Therefore,

inbreeding is dangerous putting the sheep population in serious risks in relation to the conservation of genetic resources. As mentioned above, the preservation of local breeds is now a policy priority of biodiversity programs. In Puebla, in recent years has increased dramatically the number of farms managed intensively. This results in reducing the number of animals Creoles, placing at risk of missing some animal genetic resources[5, 6]. Considering that today diversity is the sum of all species, ecosystems and ecological processes that occur on Earth in terms of conservation and the situation is different between countries, whether from those who already have defined and efficient public policies with a structure and ex situ conservation programs for the conservation in situ, to those that require basic actions. With this we can generate the question what is the situation in Mexico and Puebla? As in other developing countries, it is beginning to raise awareness of the need to conserve and preserve their own indigenous genetic heritage, as an alternative for the future linked to its own development. Analyzing the information reported for Mexico's indigenous breeds, there is a lack of management of these resources on the one hand because of the few works done and on the other, by the lack of organization in these areas, as there are some breeds native being studied. Due to the above, it is necessary for researchers, producers, and non-governmental organizations to seek alternatives that can improve the system of indigenous livestock production as well as the preservation of native genetic groups. Thus, the present study aims to characterize phenotypically the Creole sheep without ears and typify the production system where conservation is developed looking the same.

Material and Methods

Prior to the study, a field trip, by various municipalities in the north of Puebla state, among which Ixtacamaxtitlán, Zacapoaxtla, Zautla, Amixtlan, Tepetzintla, Zacatlán, Chignahuapan, Aquixtla, Cuautempan and Tetela de Ocampo. The technique for locating the earless sheep was "snowball" [7]. The Sierra Norte of Puebla is a mountainous area that has an approximate length of 100 kilometers and 50 kilometers wide. The Sierra is the product of a period of the Mesozoic orogenic process, which is why the characteristic rock type is andesite, with Andosol soil[8].

For its location and extent presents a variety of climates such as the wet semi cold with summer rainfall, temperate subhumid with summer rains, mild and humid with abundant rainfall throughout the year. Unlike other regions of the state, the Sierra Norte has high humidity and average temperature of 9.2°C and an average rainfall of 957.5 mm[8]. Productive activities are agriculture, livestock and forestry. To characterize different criteria zoometric were taken as described by Oliveira[9], Hernandez[10,11]. Sample consisted of 50 females and 12 males without ears, all adult animals with eight teeth.

Since some steps zoometric some indices were calculated as described by bodily Bravo and Sepúlveda [14], as shown in table-2.

Table-1
Zoometric measures considered for the sheep Creole characterization earless

Variable	Abbreviation	Anatomical Reference
Head length	HL	Measure between the heights of the occipital point, even the most rostral maxillary lip.
Head width	HW	Distance between the zygomatic arches
Longitudinal diameter	LGD	Distance between the shoulder joint and ischium.
Height at the croup	HC	Measure from the floor, the climax of the sacral region.
Bust measurement	BM	Measurement from the point dorsal part of the rib cage, through the sternum and back to the starting point.
Perimeter previous cane	PPC	As you take half the circumference of the metacarpal bone of the forelimb.
Perimeter of the posterior pole	PPP	Cane perimeter according[12]
Perimeter of the knee	PK	Perimeter of the knee according to[12]
Withers	W	Measure from the floor to the height of the cross (interscapular region).
Diameter dorso-sternal	DDS	Measure from the highest point interscapular and sternal olecranon lower level.
Rump width	RW	Measure between the most lateral point of the coxal cavity and the flow point of the buttock (oleo-ischial).
Distance between legs	DBA	As between a rump and another.
Distance between ischia	DBI	Media between ischium and one another.
Neck length	NL	The measurement is made from the occiput to the cross [13]

Table-2
Indices zoometric considered for the characterization of the Creole sheep without ears

Indices	Determination Formula
Cephalic index	CI= AC*100/LC
Pelvic index	PI= AG*100/LG
Body index	BI= DL*100/PT
Index of proportionality	IPRO= DL*100/ ALC
Index relative depth of the chest	IRDC=DE*100/ALC
Dactyl index chest	DIC= PC*100/PT
Transverse pelvic index	IPET= AG*100/ ALC
Longitudinal pelvic index	IPET= AG*100/ ALC
Relative thickness ratio of the reed	RTRR= PC*100/ ALC

In addition, each animal was assessed morphological and faneroptical characteristics table-3.

Table-3
Creole earless sheep morphological and faneroptical characteristics

Faneropticas And Morphological Characteristics	Abbreviation	Reference
Size of ears	SE	This will be assessed if the ears are small, medium or large
Address ears	AE	Erect, horizontal or falling
Consistency of the ears	CE	Stiff or pending
Profile cephalic	PC	Concave, straight, convex or subconvex
Type udder	TU	Globose sac or fleshy
Nipple direction	ND	Parallel or divergent
Color fleece	CF	*
•Skin color	SC	*
Length fleece	LF	*

To carry out these measurements we used a flexible tape, 1.5 m long, compass gauge, a zoometric cane and a vernier. The tape was used to measure body length, chest circumference, cane perimeter and back sternal diameter, the compass was to measure the head length, head width, rump length, distance between legs and distance between Ischia, and stick to measure the height at the withers and height at the moths. To estimate the rates and corporal variables: number of samples, mean, minimum, maximum, standard deviation, standard error, and for the analysis of correlation between the different variables, we used the statistical program SAS[15].

Results and Discussion

Were located native sheep without ears in 8 communities in the municipalities of Zacatlán, Cuautempan Tetela the Ocampo and this can be seen in the figure-1.

In the figure-2, it shows the distribution of herds in the three municipalities, the herds were located between 1640 to 2270 m, a mountainous area with difficult to access.

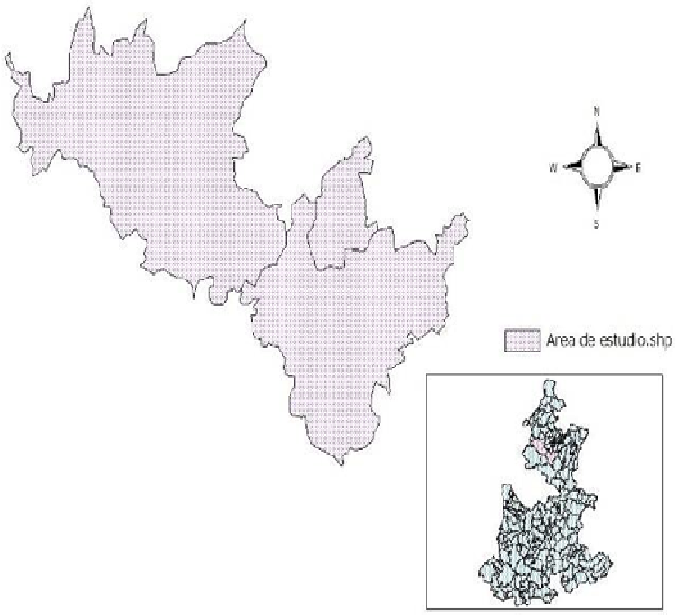

Figure-1
Study area in the Sierra Norte of Puebla

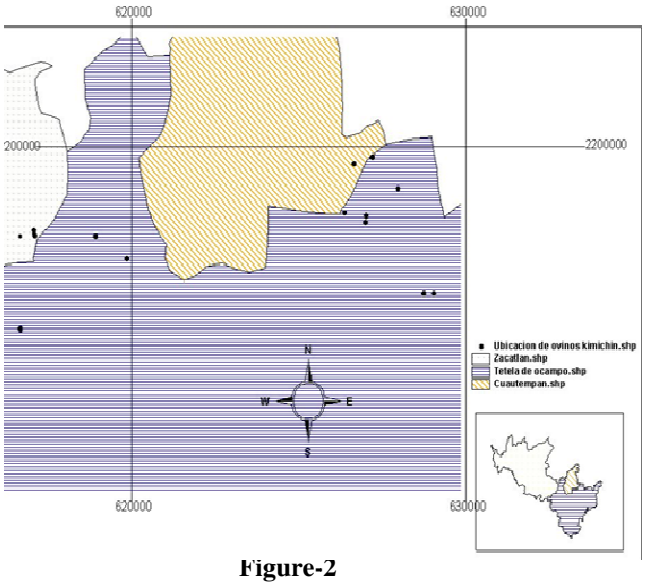

Figure-2
Locating earless sheep herds UTM coordinates

In table-4, can be observed that for native sheep without ears is predominantly a straight cephalic index 66.67% for males and 66% for females. The 33.33% and 44% respectively had a sub-convex cephalic index. The Creole sheep without ears has a tendency to ortoides profile, and nasal rub generally straight. These results were similar to studies of genetic Gallego sheep[16]. Differences in head profile can be explained through ethnological behavior[17]. The data found for native sheep resemble earless with sheep breed Chilota located in Chiloé in southern Chile[18]. Thus, as with other current Iberian breeds[19,20]. Which corresponds to the size and consistency of ears absence

was observed in 83.3% for males and 84% females. 16.7% and 16% respectively which had ears and these were small with a measure of 2 cm, probably due to hybridization with other sheep in the same region. It is noteworthy that the absence of ears makes the difference in this sheep with any other gene in the region. Regarding the type of udder type presented globose dominance with 64% and nipples address was 100% divergent. As for color mainly white with 83.33% of the cases sampled, what is the white with black with 16.67%. For the color of the fleece is exhibited greater predominance of white with 66.67%, followed the color black with 16.67% followed by the white fleece with black and white 8.33% 8.33% coffee.

In the table-5, it shows the descriptive statistics of the native sheep without ears. Presenting a long narrow head in both females and males, it indicates a clear consistency between the sexes. The native sheep exhibit earless medium head regarding Creole ears and other genetic types of the region. In relation to the neck, found an average size, which, measure has a direct relationship to the head profile[21] table-4, so the average size neck is characteristic of straight profiles. In regard to bust measurement and according to the measurements obtained indicate the presence of a compressed thorax, this can be observed in animals with low fitness meat sheep compared to other reported by various authors[21-24,12]. These measures are highly correlated with the length of the body, to stand as a compact animal.

For the dorsum-sternal diameter were presented the following measures 30.29 ± 2.93 cm in females and 29.96 ± 4.52 cm in males indicating homogeneity among both sexes is very similar to work of different races as reported ([18,12, 13, 25]). The extent of cross height was 51.80 ± 4.86 cm in females and 50.65 ± 5.03 cm in males, for croup height 54.29 ± 5.19 cm and 52.08 ± 5.16 cm respectively; these measures to define the profile of the animals; considering the Creole sheep without ears like an animal of average height. Sheep evaluated are characterized by a slight inclination of the lumbar dorsal line, which is demonstrated by presenting the croup height has a greater value than the height at the withers, characteristic of animals with poor selection[14].

Table-4
Morphological variables for creole earless sheep

Variables		Creole earless sheep			
		Females		Males	
		Absolute Frequency	Relative Frequency (%)	Absolute Frequency	Relative Frequency (%)
cephalic profile	straight	33	66	8	66.67
	convex	17	34	4	33.33
Ears Size	not presented	42	84	10	83.33
	Small	8	16	2	16.67
	medium	0	0	0	0
	large	0	0	0	0
Ears Direction Direction ears	not presented	42	84	10	83.33
	falls	5	10	1	8.33
	horizontal	3	6	1	8.33
Ears Consistency	not presented	42	84	10	83.33
	rigid	8	16	2	16.67
Udder Type	globose	32	64	-----	-----
	fleshy	18	36	-----	-----
	Bag Type	0	0	-----	-----
Nipple Direction	divergent	50	100	-----	-----
	parallels	0	0	-----	-----
supernumeric nipple	presented	0	0	-----	-----
	not present	50	100	-----	-----
Skin Color	white	17	34	10	83.33
	White / Black	29	58	2	16.67
fleece Color	white	15	30	8	66.67
	black	11	22	2	16.67
	White / Black	17	34	1	8.33
	White / Brown	7	14	1	8.33

For variables cane perimeter earlier introduced a measure of 7.73 ± 0.80 cm in females and 7.75 ± 0.57 cm in males, to the posterior pole of 10.28 ± 1.00 cm and 10.22 ± 1.81 cm and perimeter of 11.75 ± 1.10 cm knee and 11.43 ± 1.26 cm, respectively, which indicates thin canes highly related with the silhouette of the animal, and production parameters. In a comparison of sheep for the production of wool show medium to fine canes, dedicated to sheep meat production show medium to thick reeds [26], so we can consider creole sheep without ears as unproductive animal. Creole earless females, has wide rumps 10.27 ± 1.26 cm in females and 9.63 ± 1.37 cm in males; distance between ischium to 8.13 ± 0.95 and 7.03 ± 0.76 cm; distance between legs to 10.5 ± 1.03 cm and 8.83 ± 1.66 cm respectively, these variables are highly correlated in females with the ease of delivery and type of udder [16]. As relates to the length of fleece shown at 5.24 ± 2.25 cm 5.96 ± 2.44 cm females and males. Whereas the fleece as a parameter to the length productive found; According various authors the sheep producing wool fleece are characterized by a good length and weight for clothing [27,28,29]. It should be noted that this sheep produce wool that is used to make traditional costumes of the region showing preference for resistance compared to other fleece wool.

Zoometric índices: The zoometric indices studied in Table-6, were calculated from the morphological variables, this in order to determine and analyze the relationship functionalities existing in some elements such as the height, compactness, length etc. And thus estimate and determine the composition ratio of the animals.

The body index (ICO = * 100/Pt LGC) is an estimate of the proportionality of the race, allowing in this study as specific measures for this sheep, classify them brevilíneas or compact (ICO ≤ 85), noting that a minor the animals body index is closer to a rectangle, predominantly for meat production animals [30, 31]. Cocksfoot thoracic index (TDI = PC * 100/Pt) indicates the shape of the animal, allowing establishing the relationship between the mass of sheep and its members hold. According Bravo and Sepulveda [14], indicating a lower rate of an animal paws and higher classic lighter speed of an animal, an increase in this ratio indicates a trend toward an animal strength. It also provides an idea of the degree of fineness of the skeleton, its value being higher in carnivorous animals. The earless native sheep have a tendency to large formats according to the values obtained in females (11.19 cm). This index also has a link to a dairy animal with good aptitude considering therefore this animal with good attitude to this ability, which is consistent with studies with sheep Araucanians[32]. The values obtained for the index of relative depth of the chest indicate that Creole sheep without ears no good aptitude for meat production [32], considering that the higher the IPRP value, the animal gets away from the rectangular shape that is the predominant feature in meat production animals. The pelvic index gives an idea of the structure of the croup; this reason is closely related to reproductive fitness. The IPE of earless creole ewes can be classified as convexiline (IPE <100). According to the results the average IPE females indicates that the pelvis has to be run [25], presenting the sample evaluated a tendency to develop muscle tissue in the most valuable cuts [14]. The transverse pelvic index would be a favorable characteristic because it determines ease childbirth[33, 34.]

Table-5
Descriptive Statistics of the native sheep earless

Variable	Code	Females			Males		
		Media ± D.E.	Minimum	Maximum	Media ± D.E.	Minimum	Maximum
Age	ED	2.32 ± 1.06	1	4	2.25 ± 1.14	1	4
Live weight (kg)	PW	30.78 ± 6.31	22	45	28.33 ± 5.76	19	38
Head Width (cm)	HW	9.57 ± 1.12	8	12	9.65 ± 1.11	8	11
Head length (cm)	HL	16.70 ± 1.71	13	20	15.68 ± 2.84	10	19
Neck length (cm)	LN	22.37 ± 2.48	18	31	21.40 ± 2.83	15.5	26.5
Chest circumference (cm)	CC	69.02 ± 7.97	55	90	66.17 ± 9.22	51	88
Body length (cm)	LB	55.66 ± 6.26	42	73.5	52.20 ± 5.12	46	59.2
Dorso-sternal diameter (cm)	EDD	30.29 ± 2.93	21.5	35	29.96 ± 4.52	21	35.8
Withers height (cm)	HW	51.80 ± 4.86	41	62	50.65 ± 5.03	40	56.3
Croup height (cm)	HC	54.29 ± 5.19	42.5	63.5	52.08 ± 5.16	42.5	59
Rumps Width (cm)	WR	10.27 ± 1.26	7.5	13	9.63 ± 1.37	8	11.3
Perimeter previous Cane (cm)	PPC	7.73 ± 0.80	7	11	7.75 ± 0.57	7	9
Cane Perimeter Rear (cm)	PPR	10.28 ± 1.00	8.4	13	10.22 ± 1.81	7	13
Knee circumference (cm)	CK	11.75 ± 1.10	10	14.8	11.43 ± 1.26	10	13.3
Distance from Ischia (cm)	DI	8.13 ± 0.95	6.8	10.3	7.03 ± 0.76	6.3	8.5
Distance between Legs (cm)	DL	10.05 ± 1.03	8	12.5	8.83 ± 1.66	7	11
Fleece length (cm)	LF	5.24 ± 2.25	2	8.3	5.96 ± 2.44	3	12

Table-6
Zoometric indices of earless Creole sheep

Index	Media (Cm)
Ethnological indices	
Cephalic index (ICE)	57.305
Pelvic Index (EPI)	57.055
Body Index (ICO)	80.643
Functional indices	
Proportionality index (IPRO)	107.451
Index relative depth of the chest (IPRP)	58.474
Dactyl chest Index (TDI)	11.199
Transverse Pelvic Index (IPET)	19.826
Longitudinal pelvic Index (IPEL)	34.749
Index relative thickness of the shank (IERC)	14.922

Typing of the production system: The owners of herds are adults with extensive experience in the care of this type of animal table-9, with a mean of 26.2 ± 14.2 years producing this genotype. It is clear that sheep are seen as a source of savings, which is used in difficult moments of family life. Thus, age is traded over one year, when they reach a weight exceeding 30 kg Sheep are raised in a traditional system in unsuitable facilities for the production of the species, these being mostly roofed wooden pegboard table-9. It is also observable that are producers who have a limited land area with approximately 0.99 ± 1.10 ha, are small temporal properties table-7. These are practiced diversified crops, which are planted some fruit trees, such as apple, peach, plum, avocado etc., some legumes such as beans and broad beans and cereals such as corn, oats and barley. These crops are sometimes interspersed throughout the year and others are planted simultaneously. Can be seen that the native sheep producers with no ears do not buy fodder to feed their herds. Thus, the ways power is grazing land owned and along roads and highways or feeding with fodder that occur within the same property.

Table-7
Property Characterization

Characterization	Absolute Frequency (%)	Relative Frequency (%)
small property	14	100
Temporary Land	14	100
Agricultural Use	1	7.3
Mixed Use	13	92.7
Purchase forage	2	14.3
Purchase forage in July and December	2	14.3
No purchase fodder	12	85.7
Extensive production system	14	100
Graze on their property	8	57.1
Pastors in roads and road banks	6	42.86

In the table-8, it summarizes the outcome where it is clear that the native sheep without ears do not receive health management, not Vitaminan, not desparasitan and not vaccinated. It's just the administration of mineral salt supplement occasionally administered.

Table-8
Herd management

Questions	Absolute Frequency	Relative Frequency
Management of mineral salt	11	78.57
No mineral salt administered	3	21.43
Vaccine derriengue	2	14.3
No vaccine	12	85.7
deworming	3	21.43
No deworming	11	78.57
vitamin	10	71.43
No vitamin	4	28.57

The status of earless sheep producers is summarized in table-9, where you can see that producers are deprived of financial capital, with rustic homes built of wood and cardboard sheet and floor mostly. The feeding of these families as often as they eat meat was considered for what is good for this experiment as bad as consuming meat only occasionally. This is due to the high cost of meat products of different species and low wages that have producers who are employed as laborers at a wage of $ 78.00 Mexican equivalent 6.00 U.S. dollars, they used to feed, clothe, education etc. to family members.

Conclusion

We conclude that the Creole sheep without ears has a small size of harmonious proportions, dominating the color scheme in the layer, followed by black, white and the combination of these two (white with black). Presents straight cephalic profile head and no ears. In addition to a significant number of individuals

have convex profile aloidismo sub group within the population. The neck is of medium length and slightly muscular. The trunk is proportional, with narrow thorax and balanced udder the size of the animal. The limbs are thin, naked and well-set, live weight for females is between 22 and 45 kg for males between 19 and 38 kg. By presenting a skeleton well developed and suitable for harsh environment Creole sheep without ears, is well adapted to poor grazing. The earless sheep producers are low technological and economic resources, have animal.

Table-9
Features Social and Infrastructure Type

Questions	Absolute Frequency (%)	Relative Frequency (%)
The home you live in is own	14	100
The construction of the house is brick or Block	5	35.71
Houses made of wood	9	64.29
The roof of the house is made of cement	2	14.29
The ceiling is made of laminated cardboard or asbestos	12	85.71
The floor of the house is ground	8	57.14
The floor of the house is made of cement	6	42.86
It has the electricity and water	14	100
Their feeding is good	0	0
Their feeding is regular	2	14.29
Their feeding is bad	12	85.71
Has a medical service	2	14.29
Does not have medical service	12	85.71
Besides sheep production is dedicated to journeyman	14	100

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