Important Causes of Mortality in Caprine Units in the Silvopastoral Environment of the Mixteca Poblana

Causas Importantes de Mortalidad en Unidades Caprinas en Ambiente Silvopastoril de la Mixteca Poblana

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Jorge Ezequiel Hernández Hernández
Doctor in Veterinary Sciences from the Faculty of Agricultural Sciences, Camagüey, Cuba.
Institution: Full-time Research Professor of the Faculty of Veterinary Medicine and Zootechnics of BUAP, Puebla, Mexico
Address: El Salado, Tecamachalco, Puebla, Mexico
E-mail: ovichiv_05@yahoo.com

Salomón Moreno Medina
Master in Business Administration from the Autonomous University of Sonora.
Institution: Full-time Research Professor at the Faculty of Administration and Agricultural Sciences of the Autonomous University of Sonora, Mexico
Address: Santa Ana, Sonora, Mexico
E-mail: Salomon671@gmail.com

Martha Hortensia Martín Rivera
Ph.D. in Grassland Management and Improvement from Utah State University (USA).
Institution: Full-time Research Professor at the Faculty of Administration and Agricultural Sciences of the Autonomous University of Sonora, Mexico
Address: Santa Ana, Sonora, Mexico
E-mail: hortencia.martin@unison.mx

Fernando Arturo Ibarra Flores
Ph.D. in Grassland Management and Improvement from Utah State University (USA).
Institution: Full-time Research Professor at the Faculty of Administration and Agricultural Sciences of the Autonomous University of Sonora, Mexico
Address: Santa Ana, Sonora, Mexico
E-mail: fernando.ibarra@santana.uson.mx

Julio C. Camacho Ronquillo
Doctor in Animal Science and Livestock from the Montecillo Campus Postgraduate College, State of Mexico.
Institution: Full-time Research Professor of the Faculty of Veterinary Medicine and Zootechnics of BUAP, Puebla, Mexico
Address: El Salado, Tecamachalco, Puebla, Mexico
E-mail: julio.camacho@correo.buap.mx

Fernando Utrera Quintana
Doctor in Genetic Resources and Productivity from the Montecillo Campus Postgraduate College, State of Mexico.
RESUMEN
Estudio realizado en comunidades de Tehuaxtla y Maninalcingo, pertenecientes a la Mixteca Poblana. Objetivo: conocer las importantes causas de mortalidad en unidades de producción caprina del ambiente silvopastoril de la Mixteca Poblana. Se eligieron 3 unidades de producción caprina con una población total de 174 cabras en diferentes fases productivas (machos de gestación, lactancia, cría y ceba). Con una vida productiva promedio de 3.3 años, el 63% correspondió a cabras criollas, 21% cabras Boer y 13% a Saanen. Las cabras se manejaban en un sistema silvopastoril, donde consumían una variedad de plantas arbóreo-arbustivas, en el caso de Ipomea arborencens (casahuate blanco), provocaba intoxicaciones en las cabras de la Mixteca Poblana. Murieron 29 de las 174 cabras, el 4% correspondió a muertes nerviosas por consumo de casahuate blanco y el 5,1% por abortivo. Las pérdidas económicas fueron de $ 978. La sistematización de los programas de Medicina Preventiva, cambios y reducciones en las rutas de pastoreo de los rebaños de cabras, se recomiendan para reducir la incidencia de muertes nerviosas debidas al consumo de árboles de Ipomea arborencens.

Palabras clave: Muertes, cabras, silvopastoril, plantas, producción.

ABSTRACT
Study carried out in communities of Tehuaxtla and Maninalcingo, belonging to the Mixteca Poblana. Objective: to know the important causes of mortality in goat production units in the silvopastoril environment of the Mixteca Poblana. 3 goat production units were chosen with a total population of 174 goats in different productive phases (gestation, lactation, breeding and fattening males). With an average productive life of 3.3 years, 63% corresponded to Creole goats, 21% Boer goats and 13% to Saanen. The goats were managed in a silvopastoril system, where they consumed a variety of arboreal-shrub plants, in the case of Ipomea arborencens (white house), it caused intoxications in the goats of the Mixteca Poblana. 29 of the 174 goats were killed, 4% corresponded to nervous deaths due to consumption of white cassava and 5.1% due to abortifacient. The economic losses were $ 978. The scheduling of Preventive Medicine programs, changes and reductions in the grazing routes of goat herds; they are recommended to reduce the incidence of nerve deaths due to consumption of Ipomea arborencens.

Keywords: Deaths, Goats, Silvopastoril, Plants, Production

1 INTRODUCTION

Goat farming is one of the most important livestock activities nationwide. The goat for its multiple characteristics of adaptability, rusticity and use of waste, is considered a species that generates significant income to the family economy through the products obtained; however, this can change if diseases are presented from different causes and increase their mortality and low productivity [1].
The premature death of animals is the result of disease, as well as accidents or intentional action by third parties, and has a pronounced effect on the productivity of animal populations. In intensive farming, mortality costs are higher when animals with high genetic potential die during the years of peak production [2], [3].

The death of a kid implies the loss of an animal for sale, such as a weaned or fattened kid, and also the money invested in the purchase of the stallion and in the feeding of the goat in its pregnancy; in the case of free-standing animals the loss is even greater or of the fattened [1].

[4], establish that there are different causes of death in goats, which include various infectious, non-infectious and even socio-environmental factors. As is the case of climatic, accidental, predator, nutritional, reproductive deficiencies or in some cases unknown [5].

It is essential to point out that there are diseases and problems that alter the health of goats in different production units in Mexico. Therefore, those of the respiratory, digestive, reproductive, parasitic, neuromuscular and other causes stand out [5], [6], being the case of traumatic, plant poisonings and poisonous animal bites.

The importance of the main causes of death in goat production in our country stand out for their environmental origins such as: natural or artificial [7], [8], point out that the mortalities of sheep and goats in herds can be considered high, moderate or low; this will depend on the type of cause or factor that may be associated or determined in the region [9].

The Mixteca Poblana, despite having a high percentage in the production of this species; Its family-type production units have goats under a silvopastoral production system, which favors low feeding costs, making them profitable, but without knowing the impact of its fatal causes on this species, affecting its sustainable production in the Mixteca region [10].

The objective of this work was: know the important causes of mortality in Silvopastoral Environment Goat Units in the Mixteca Poblana.

2 MATERIALS AND METHODS

A LOCATION OF THE STUDY

Work in communities and Maninalcingo Tehuaxtla, located in the municipality of Piaxtla, within the specified region as the Mixteca Poblana south of the province of Puebla in Mexico. The study area is located in the parallel 17 ° 59' 00" 18 ° 12' 30" north latitude, 98 ° 10' 54" 98 ° 21' 36" West longitude [11], with an altitude of 1180 m and with an annual rainfall of 350-800 mm. Present-spinous low deciduous forest and xerófita, izotes scrub and tree-shrub vegetation types; further small localized areas of oak forest and pastures. The climate is warming humid with rains in summer and very warm semi-dry season, reaching an average temperature of 23 °C.
B STUDY METHODOLOGY

A previous meeting was scheduled with the family producers of the goat units, with the face-to-face support of the local government, where the objective of the study, the projection and the possible scope of this in the goat culture of the Mixteca region were explained in detail, with the support of a power point presentation for your explication. Subsequently, a survey was made in relation to their productive activities, but mainly outlining the health (causes of mortality) of the herd.

Three goat Family Production Units with cardinal points (north, center and south) were randomly chosen from the communities considered in the study. A randomly evaluated survey was applied. The survey integrated indicators such as: production unit, name of the production unit, number of animals in the herd, period, stage or age in which death occurs, signs and cause of death [12]. This survey was applied in the form of an interview to the producers of the three units under study.

3 notebooks were used, 3 support tables for data annotation, 3 pens, 1 camera type BF-800 Canon and 1 vehicle for transportation to the study region.

C STATISTICAL ANALYSIS OF THE STUDY DATA

Finally, the captured data were ordered and classified with respect to the indicators used in the survey, for statistical analysis; through the Excel program (Microsoft Corp.) and the statistical package (SPSS 10.0) for Windows. The study ran from July to December 2012.

3 RESULTS

The study finds that the three goat production units (GPU) of the Tehuaxtla and Maninalcingo communities have a small and diverse goat population with respect to their racial line, age, productive phase, time of year and signs shown before the death of the goat (Table 1).
Table 1: General Indicators of the GPU in the Mixteca Poblana of México

<table>
<thead>
<tr>
<th>INDICATORS</th>
<th>GPU (1) &lt;sup&gt;*M&lt;/sup&gt;</th>
<th>GPU (2) &lt;sup&gt;*M&lt;/sup&gt;</th>
<th>GPU(3) &lt;sup&gt;**T&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community (*M=Maninalcingo)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>**T=Tehuaxtla)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goat population</td>
<td>58</td>
<td>64</td>
<td>52</td>
</tr>
<tr>
<td>Racial line</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creole</td>
<td>32</td>
<td>45</td>
<td>38</td>
</tr>
<tr>
<td>Saanen</td>
<td>10</td>
<td>07</td>
<td>05</td>
</tr>
<tr>
<td>Boer</td>
<td>16</td>
<td>12</td>
<td>09</td>
</tr>
<tr>
<td>Medium age (years)</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Productive phase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactation</td>
<td>15</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Gestation</td>
<td>30</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Priming</td>
<td>10</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>Breeding males</td>
<td>03</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td>*Month of the year</td>
<td>1,2,3,4,5,6,7,8,9,10,11,12</td>
<td>2,6,11</td>
<td>3,6,12</td>
</tr>
<tr>
<td>**Clinical signs before death</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diarrhea (1)</td>
<td>1,2,5,6</td>
<td>1,4,5,6</td>
<td>2,3,4,6</td>
</tr>
<tr>
<td>Respiratory (2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food (3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuromuscular (4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abortions (5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parasitic (6)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Number of month in year
** Clinical signs shown before death

Results regarding the racial line of unit 1 of Maninalcingo, it was found that 55.2% corresponded to Creole goats, 17.2% to Saanen goats and 27.6% to Boer goats. Unit 2 of Maninalcingo, found 70.3% of Creole goats, 10.9% for Saanen goats and 18.8% for goats of Boer racial line. Finally, unit 3, which corresponds to Tehuaxtla, found 73% of Creole goats, 9.6% for Saanen goats and 17.3% corresponded to Boer goats.

In figure 1, the results are concise regarding the racial line of the three goat production units in silvopastoral environment, belonging to the communities of the Mixteca region. Thus, the highest to lowest percentage was represented by the breed line of Creole goats, Boer goats and Saanen goats; adding, a total of 174 goats considered in the study of the communities of Maninalcingo and Tehuaxtla.
Figure 2, indicates that of the 174 goats of the 3 GPU; they have a productive maturity of 3.3 years on average; with different percentages, with respect to lactating, pregnant, fattened and reproductive males.

The total population of 174 goats of the 3 GPUs, results found with respect to the productive phase, the gestation stands out with 72 goats that represent 41.3% of the production units in the Mixteca Region of Puebla, Mexico.

It is important to point out that the goats of this region, their management is completely silvopastoral in hilly parts and slopes with a large amount of arboreal-shrubby consumption; However, problems of miscarriages when grazing, deaths from poisoning and other causes of mortality were found in Mixtec goats (Table 2).
Table 2: Signs and causes of mortality found in the goat production units of Maninalcingo (1, 2) and Tehuaxtla (3) in the Mixteca Poblana.

<table>
<thead>
<tr>
<th>Goat unit number</th>
<th>Observed signs</th>
<th>Affected goats</th>
<th>Dead goats</th>
<th>Overall deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diarrhea</td>
<td>5</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Respiratory</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abortive</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parasitic</td>
<td>45</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Diarrhea</td>
<td>4</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Nervous</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abortive</td>
<td>6</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parasitic</td>
<td>42</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Respiratory</td>
<td>4</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Alimentary</td>
<td>17</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nervous</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parasitic</td>
<td>38</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

The percentage result with respect to the 29 dead goats of the 174 that added the 3 GPUs was 16.6%; of which 1.7% corresponded to deaths from diarrhea, 1.7% to deaths from respiratory causes, 1.1% from food deaths, 4.0% from nervous deaths, 5.1% from abortive deaths and 2.8% from parasitic deaths.

Table 3: Some productive and economic aspects due to mortality causes in the GPUs of the Mixteca Poblana.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productive</td>
<td>1</td>
<td>4.</td>
<td>2.5</td>
<td>1.29</td>
</tr>
<tr>
<td>Number of Deaths</td>
<td>1</td>
<td>13</td>
<td>7.2</td>
<td>5</td>
</tr>
<tr>
<td>Economic losses (USD)</td>
<td>293</td>
<td>1396</td>
<td>978</td>
<td>478</td>
</tr>
<tr>
<td>Goat age</td>
<td>1</td>
<td>4.</td>
<td>2.8</td>
<td>1.3</td>
</tr>
</tbody>
</table>

In Table (3), the statistical mean for economic losses of dead goats in the 3 GPUs is observed, it is important to point out; the long-lived potential, where goats with an average age of 2.8 years succumbed to causes of diarrheal, respiratory, alimentary, neuromuscular, abortive and parasitic mortality. The age of the goat was completely significant with respect to its mortality; Since Table (3) shows us the short productive life due to not having health and well-being conditions in the GPUs of Maninalcingo and Tehuaxtla in Mxteca Poblana.

4 DISCUSSION

Goat farming in the Mixteca Poblana is important because of the role it plays in the family economy, being a typical example of the goat production process, because the exploitation of goats represents the most accessible economic resource, after the rest periods in the rainfed agriculture. [13], mention very similar aspects of goat farming in the Mixteca Poblana, stating that the herds of
the Mixteca region are very atomized; with a reduced number of goats, ranging from 40 to 60 goats per herd, with breeds such as Nubia, Alpina and, to a lesser extent, Saanen standing out, without mentioning some percentages of these goat populations in the study they carried out.

When considering a reproductive female, we must take into account the replacement rate, which should be 16.5%, which allows the herd to be renewed after the fifth calving. Although this index should not be taken as an inviolable rule or mechanically; since there are studies [14], it establishes that the productive life of the goat will be on average no more than 6 to 7 years. Although other studies suggest not exceeding 5 years of age [15].

The silvopastoral life of goats in the Mixteca Poblana is an important activity in their productive management; although there are no control programs for some diseases, the presence of arboreal-shrub forages (some legumes) have decreased some percentages of gastrointestinal parasites because they contain antinutritional factors such as tannins [16]. The integration of goats in the grazing of the herbaceous cover contributes to the control of weeds, reduces production costs, reduces contamination by herbicides and diversifies the income of the producer [17].

Goats have been used as a valuable tool in the control of undesirable shrubs. Control of the tsetse fly, which transmits the trypanosome that causes “sleeping sickness”, is carried out in Africa with trypanotolerant goats that, when handled with heavy loads browse and reduce the bushes where the flies lodge [18]. However, it is important to monitor the consumption of some toxic forages present in the Mixteca Poblana, being the case of the Ipomoea arborescens (white casahuate), since deaths have been reported due to neuromuscular damage and injuries in goats [9].

The presence of digestive disorders (diarrhea), in the Mixteca Poblana, as found in this study, the percentage is not so high; However, it is worrying regarding the deaths of the nervous and abortifacient type, since both causes accounted for 9.1% of the three herds evaluated. These results are very similar in the municipality of Piaxtla, San Juan Tzicatlacoyan, and San Martin Atexcatl in the Mixteca region of Puebla [5], [9], [13].

Finally, the economic losses of the dead goats in the three GPUs are important; since, death with respect to the potential longevity close to 3 years deteriorates the income and profitability of the producers of that Mixteca region in Puebla. His productive life of the goats with respect to the age in the herd is a beneficial indicator in any production unit; therefore it generates: health, income, animal welfare and roots to the community of the inhabitants [10].

5 CONCLUSIONS

In conclusion, the goat production units in the Mixteca region of Puebla (Tehuaxtla and Maninalcingo) maintain a low average of 58 goats per production unit. This is due to the conditions
of the geographical environment; since the topography of the region is completely broken, maintaining a sub-deciduous flora of arboreal-shrub type. This flora turns the goat production area in the Mixteca region into a forage bank; which is classified as a completely silvopastoral system.

The silvopastoril system in this study region is completely beneficial for the feeding of goats; However, due to the same conditions of silvopastoril forage potential, it is a little risky when consuming some toxic plants, being the case of Ipomoea arborescens (white casahuate), which manifests when consuming nervous signs such as incoordination when walking, prostration, depression, collapse in a period of 24 to 72 hours and death from respiratory arrest. This can be reduced with a management of goat herds, not leading to grazing areas with the highest density of Ipomoea arborescens (white casahuate), changing the grazing route of goats in the silvopastoril system. It is recommended to evaluate the active principles of some plants that can be toxic, and that can cause deaths at an early age when consumed by goats in the Mixteca Poblana region of Mexico.

Structuring annual calendars of Preventive Medicine to control diarrheal and respiratory problems (pneumonia) and abortifacient due to blows or consumption of toxic plants. The vaccination scheme, food supplementation and protection favorable to the environment are recommended to support their animal welfare.
REFERENCES


