Horse Meat for Human Consumption in México: Slaughter Performance and Carcass Morphometry

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Abstract: In Mexico, equine use for meat production is not commonly found, the highest percentage of equine meat that can be possibly consumed comes mostly from culling animals. The objective of the present study was to characterize the slaughter performance and test the effect of gender in the incidence of injuries during transportation, in offals and hot carcass yields in twelve creole horses. Results indicate an average live weight of 296 Kg and carcass weight of 175 Kg, equivalent to 60% yield. It is possible that the butchery method commonly used on pasturing the animals, decreased the thoracic development and increased the corporeal length and diameter of the leg. With regard to slaughtering yield, red viscera represented 4.3%, green viscera 30%, skin 6%, limbs 2.8%, head 4.4% and loss at slaughter 1.5% of the total live weight. Average body condition in the horses was poor. No significant differences were observed between genders in the presence of injuries, although there was an influence of the arrival position on the severity of injuries; animals that were facing the direction of travel (rear-facing) showed injury 2 affecting subcutaneous and muscular tissues, whereas animals facing backward did not show injuries or these were not too severe.

Key words: Horses, slaughter performance, Mexico

INTRODUCTION

Currently, horse meat consumption is unusual. However, some European countries, like France, include horse meat in their diets and nowadays they even have to import it in order to meet demand. In Mexico, equine use for meat production is not commonly found. The highest percentage of equine meat that can be possibly consumed comes mostly from culling animals (injured and old donkeys and horses mostly), from different towns, circuses or auctions and is destined to feed dogs or carnivorous animals at zoos. This species is in disadvantage with domestic ruminants for two important reasons. First, Mexicans consider horses as pets, companion and sporting performance animals; they are mostly used as a source of labor and transportation, therefore the habit to consume horse meat is not widely accepted and second, this species have a feed conversion of 10-11 Kg of high quality food to gain 1 Kg of live weight, whereas bovines need 7 Kg of food to produce 1 Kg of live weight; consequently this activity is not profitable. For this reason, horse meat production arrive to the abattoir as culling animals, when they have finished their productive life in diverse activities. Horse breeding for slaughtering purposes is not a revenue-yielding business for Mexican cattlemen, since equine meat is much more expensive than bovine, swine or ovine meats, because the latter species show faster growth and better weight gain and carcass yields compared with horses.

Several horse breeds are found in Mexico, however, the one that prevails the most (90%) is the creole (serrano) horse, a crossbreed of Andalusian и Arab horses that has adapted to the country’s environmental conditions through time. These animals as other species of zootechnic interest have not been raised appropriately in order to obtain their maximum genetic capacity. At the moment there is not enough information available on equine livestock carcass yield in Mexico.

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Transportation to slaughterhouses is still the main cause of injuries, stress and animal bites. In addition, some studies indicate that certain orientation of horses during transportation do possibly cause adverse effects. When facing the direction of travel, Cregier proposed that horses sense an increased vulnerability to head and chest injuries. In fact the mere act of maintaining balance is an additional source of stress in transported horses. The objective of the present study was to characterize the slaughter performance and test the effect of gender in the incidence of injuries during transportation, in offals and hot carcass yields in creole horses.

MATERIALS AND METHODS

The study was carried out at the slaughterhouse located in in Texcoco, State of Mexico, during October and November, 2004.

Animals and groups: Twelve adult horses were used: 6 males (group 1) and 6 females (group 2), they were transported in trucks with a stocking density of 0.86 square meters per animal with a layer of oat straw bedding during 4 hours.

Transportation evaluation: At arrival to the abattoir, breathing frequency was measured in each animal, quantifying the number of aspirations per minute. At the same time rectal temperature was determined using a citizen digital thermometer (CIT561 CF).

Also, the orientation of the animals was observed; that is, the orientation of the head with relationship to the direction of travel. Likewise, a detailed examination of the horse’s body was carried out in order to identify the presence of injuries. Injury severity was determined using the following classification: injury 1 (11) affected skin and subcutaneous tissues; injury 2 (12) affected subcutaneous muscular tissues and injury 3 (13) affected subcutaneous muscular and bone tissues.

Body condition was evaluated according to Remmelk et al. method of direct observation. A scale of 1 to 9 was used, where 1 was very thin and 9 obese. Animal’s live weight was measured with a platform scale to obtain the carcass yield.

Evaluation of slaughtering, carcass and viscera yields
The activities carried out at slaughtering for every animal were:

- Head, skin, limbs, red and green viscera were weighed to determine their percentage yield.
- Age was calculated by Bone’s dental formula.
- pH was measured 45 min after slaughtering in the tenth rib of the Longissimus dorsi muscle, using a Hanna Instruments potentiometer (Penetration pH electrode, HI8314, pH meter membrane, 115V/60Hz. Cod. 1.1176).
- The carcass yield was determined dividing the hot carcass weight by the live weight of the animal and multiplying it by 100.

Carcass morphometry: The following measurements were performed in each carcass:

- Length of the leg: distance between the ischiatic tuberosity and the hook joints.
- Carcass length: distance between the mid section of the anterior border (fore-border) of the first rib to the ischiatic-pubic symphysis.
- Thorax depth: distance between the inferior parts of the breastbone to the mid dorsum.

Morphometric measurements were determined using a flexible three meters metric tape.

Statistical analysis: The PROC UNIVARIATE command of the SAS program (version 8.1) (2002) was used for all measured variables.

Variable results at slaughtering were analyzed at random using the following mathematical model:

\[
Y_{ij} = \mu + \tau_j + \xi_{ij}
\]

\[
I = \text{Groups } 1, 2, \quad j = 1, 2, 3... \text{ Repetitions}
\]

Where:

- \(Y_{ij}\) = Variable result
- \(\mu\) = General mean
- \(\tau_j\) = Effect of the group (sex)
- \(\xi_{ij}\) = Random error

The Tukey test was used (p<0.05) to determine significant differences between groups. SAS V 6.12 (1997) was used for the analysis of the groups’ effect on the different traits. The results were analyzed according to the proposed model and by means of the following procedures: for the specific cases of the variables: body condition, rectal temperature at arrival, breathing (respiratory) frequency and meat pH, a test was used. For comparisons of meat pH values between groups, a Mann-Whitney U test was performed.

RESULTS AND DISCUSSION

The injury incidence in the monitored horses is shown in Table 1. No significant differences were found