

MORPHOLOGIC CHARACTERISTICS IN MEXICAN NATIVE PIGS

CARACTERÍSTICAS MORFOLÓGICAS EN CERDOS NATIVOS MEXICANOS

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ADDITIONAL KEYWORDS

Creole pig. Mexican Hairless pig. Mule Foot pig. Syndactyle.

PALABRAS CLAVE ADICIONALES

Cerdo Criollo. Cerdo Pelón Mexicano. Cerdo Pata de Mula. Sindactilia.

SUMMARY

22 Mexican Hairless Pigs (MHP) and 20 Cuino Pigs (CP) which belong to the Mexican Native Pig (MNP), were raised under agricultural-grazing conditions in the State of Nayarit, Mexico were studied. MHP showed a higher number of nipples ($p < 0.01$), from 10 to 14 with an average of 10.9, and a higher back (64.81 cm), body (85.11 cm) and snout length (19.44 cm) ($p < 0.01$) than CP. In general terms this breed presented more of a lengthier body than height compared with the CP. The vertebrae formula C7, T15, L6 and S4 in all MNP (MHP, CP and another creole breed, the Mule Foot (MF)) corresponded to that of the modern pig. The MF syndactyle showed one second and one third extra phalanxes in comparison to the other breeds.

RESUMEN

Se estudiaron 22 Cerdos Pelón Mexicano (CPM) y 20 Cuinos (CC), ambas razas de Cerdo Nativo Mexicano (CNM) criadas en condiciones agro-pastoriles en el Estado de Nayarit, México. El CPM mostró un mayor número de pezones ($p < 0.01$), presentando de 10 a 14, con una media

de 10,9; una mayor altura anterior (64,81 cm), longitud del cuerpo (85,11) y trompa (19,44) ($p < 0,01$), teniendo mayor longitud del cuerpo que altura en comparación con los CC. La fórmula ósea, C7, T15, L6 y S4 en todos los CNM (CPM, CC y otra raza Criolla, el Pata de Mula (PM)) correspondió con la del cerdo moderno. La sindactilia en el PM consistió en una segunda y tercera falange más en comparación con las otras razas.

INTRODUCTION

According to the DAD-IS (Domestic Animal Diversity Information System) three local Mexican Native Pigs (MNP) have been recognized: the Birich, the Big Hoof pig, also named Coscate and the Cuino, which correspond to the Mexican Hairless Pig (MHP), the Mule Foot (MF) and the Cuino (CP) respectively (FAO, 2000). Due to the constant introduction of improved breeds, the native pig is in danger of being absorbed until

extinction (Loftus and Scherf, 1993). The Mexican Creole pig populations may be a reservoir of genetic diversity that is important to preserve and evaluate as a source of new alleles for the future improvement of commercial pig lines (Lemus-Flores *et al.*, 2001).

This sole observation in previous works have led us to quantify that the number of animals have decreased, tending to disappear within a five year period, without having the complete knowledge of their advantages, and at a high risk of extinction (Lemus *et al.*, 1999).

MATERIAL AND METHODS

In this study morphologic measurements were done on MNP, 22 Mexican Hairless and 20 Cuino pigs from 162 to 851 days of age. Animals were raised in the State of Nayarit in Mexico at agro-grazing farms. Statistical differences were established for morphological measurements including: number of nipples (NIPPLES), back height

(HEIGHT) (cm from ground to last cervical vertebrae), body length (LENGTH) (cm from shoulder end to first coccygeal vertebrae), snout length (SNOUT) (cm from front nasal suture to end of snout), and thoracic perimeter (TP) (cm of circumference behind the back). All the measurements were done according to age (days) and estimating the body index [BI = (body length x 100)/ back height].

The following models for statistical variance analysis was used:

$$Y1_{ij} = \mu + \text{MNP population}_i + \varepsilon_{ij} \text{ and } Y2_{ij} = \mu + \text{MNP population}_i + \beta x + \varepsilon_{ij}$$

Where: Y1= variable NIPPLES and Y2= variables HEIGHT, LENGTH, SNOUT and BI individually by unvaried analysis. βx were effects of co-variable age. MNP population_i was MHP and CP. ε_{ij} was the aleatory error.

In order to obtain the anatomic differences, X rays were used testing two 2-month-old piglets for each phenotype of MNP (MHP, CP and MF).

Table I. Minimum quadratic levels and statistical differences of morphological measurements in breeding native pigs. (Medias mínimo cuadráticas y diferencias estadísticas de mediciones morfológicas en razas de cerdos nativos).

Pig breed	Number of animals	NIPPLES (number)	HEIGHT (cm)	LENGTH (cm)	SNOUT (cm)	BI
GLOBAL	42	10.9±1.2	58.76±9.5	72.85±19.2	17.56±2.8	123.07±21.3
MHP	22	11.50a	64.81a	85.11a	19.44a	131.11a
CP	20	10.25b	52.91b	59.69b	15.98b	113.07b

MHP: Mexican Hairless Pig; CP: Cuino Pig; BI: Body index; ± Standard deviation; Distinct letters in a column show significant differences, $p < 0.01$.

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RESULTS AND DISCUSSION

MORPHOMETRIC DIFFERENCES

For the breeding stock the MHP breed (**table I**) had a higher number of nipples which was significantly different ($p < 0.01$) as compared to the CP; the MHP showed a minimum of 10 and a maximum of 14. Insofar the HEIGHT, LENGTH, and SNOUT variables in the MHP showed higher values ($p < 0.01$). Animals age had significant effects ($p < 0.01$) over these three measurements resulting in a regression of 0.005, 0.02, and 0.04, respectively. When comparing these results with others, they do not defer (back height and body length 58.6 and 82.7 cm), but rather strengthen the affirmation that there does not exist artificial selection in this creole pigs (Lemus *et al.*, 1999).

For both breeds a significant correlation was observed in HEIGHT with LENGTH and SNOUT (0.63 and 0.88); body LENGTH was not significantly correlated ($p > 0.05$) with SNOUT length in the CP. The body index calculated at breeding was significantly higher ($p < 0.01$) for the



Figure 1. Syndactile (fusion of toes) in the Mule Foot pig. (Sindactilia (fusión de dedos) en el cerdo Pata de Mula).



Figure 2. Radiograph showing an extra phalanx. (Radiografía presentando una falange extra).

MHP, in this breed there is more body length than height.

MHP characteristics are: lack of hair, black coloured, medium size, long and narrow snout; whereas CP has red-greyish coloured hair, small size and short snout. Morphological differences found in the present study would allow a better differentiation between both breeds, since they conserve the distinctive characteristics from their ancestors; MHP has the European type (Celtic and Neapolitan), and CP the Asian (Indicus), and it has been demonstrated that both types have ancestral divergence (Giuffra *et al.*, 2000).

ANATOMIC DIFFERENCES USING X RAYS

No differences were found in the bone structure, the vertebrae formula was: 7 cervical, 15 thoracic, 6 lumbar, and 4 sacrum; this coincides with the modern pig formula (Sisson and Grossman, 1979). Hence, the MNP has the *Sus scrofa* classification. The native Mule Foot pig showed syndactyle (fusion of fingers and toes; **figure 1**) in the front and hind hoofs; the first of the three phalanges were similar to those of pigs without syndactyle. It was noticed that the second phalanges were shorter, as well as the presence of another phalanx between the principal fingers, resulting in 5 second phalanges instead of 4 normal ones. They also showed a third phalanx between the principal fingers and these were longer than in their counterpart without syndactyle (**figure 2**). The

second and the third phalanges of the main fingers were fused, which did not allow the separation of the main fingers producing syndactyle, keeping a fusionated hoof. Advantages from this abnormality had been taken to raise animals resistant to Swine Fever and with less locomotor problems (Arias, 2000).

In conclusion, morphological differences were found; the MHP had more nipples, was higher, lengthier in body and snout, and longer than higher than the CP. X rays showed no differences in bone structure between MHP, CP, and MF. The syndactyle was present in both front and hind hoofs of the Mule Foot pig. This pigs showed 5 second phalanges instead of 4 normal ones; the second and the third phalanges from the principal fingers were fused producing syndactyle.

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