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*Proceeding Paper*

# Morphometric Characterization of Algerian Fantasia Horses at a National Equestrian Competition †

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**Abstract**

This study aims to evaluate the morphometric characteristics of Algerian Fantasia horses. A sample of 25 Fantasia horses was measured, with six key morphometric parameters recorded. Body indices were calculated to analyze their structural conformation. These horses, mainly of the Barb and Arab-Barb breeds, exhibit variability due to breeding objectives, whether aesthetic or functional. The results showed that the withers height was 155.19 ± 2.76 cm, with a body length of 154.31 ± 4.38 cm, indicating a square-type conformation, as confirmed by a body profile index of 1.01 ± 0.02. The dactyl-thoracic index was 0.11 ± 0.004, indicating bone thickness consistent with body weight.Comparisons with existing studies highlight the unique physical characteristics of these horses. The results provide valuable data for future research and breeding programs.

**Keywords:** Algerian Fantasia horses; morphometric study; body indices; Barb horses; Arab-Barb horses

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## 1. Introduction

The Algerian Fantasia horse is a key component of the country's cultural heritage, playing an essential role in traditional Fantasia performances. These horses, primarily derived from the Barb and Arab-Barb breeds, are known for their agility and endurance, which are historically valued in North African equestrian traditions [1,2]. However, breeding choices can vary, prioritizing athletic abilities or aesthetic traits [3]. Despite their cultural significance, few formal morphometric studies have been conducted on Fantasia horses [4,5]. This study aims to provide a detailed morphometric characterization of these horses, focusing on key measurements and body indices. Such analyses are crucial for capturing their physical structure and potential, forming a scientific basis for future breeding and conservation efforts.

## 2. Materials and Methods

A total of 25 Algerian Fantasia horses were measured during a national equestrian competition. Six key morphometric parameters were recorded: withers height (WH), croup height (CH), body length (BL), head length (HL), chest girth (CG), and fore cannon

girth (FCG). From these measurements, Weight and several body indices were calculated to assess structural conformation. The statistical analysis involved the use of Principal Component Analysis (PCA) to identify the key morphometric parameters contributing to the variability observed within the sample. To complement this multivariate approach, Pearson correlation coefficients were computed to evaluate the strength and direction of the associations among the various body measurements.

## 3. Results and Discussion

### 3.1. Morphometric Measurements

The recorded results are presented in Table 1.

**Table 1.** Body measurements of Fantasia horses in Algeria.

| Abbreviation | Measurement | Mean ± SD | Min | Max |
|---|---|---|---|---|
| **WH** | Withers Height (cm) | 155.2 ± 2.76 | 150.2 | 161 |
| **CH** | Croup Height (cm) | 154.5 ± 2.86 | 150 | 160 |
| **BL** | Body Length (cm) | 154.3 ± 4.38 | 146 | 161.6 |
| **HL** | Head Length (cm) | 60.8 ± 1.83 | 56.5 | 64 |
| **CG** | Chest Girth (cm) | 182.5 ± 4.99 | 172 | 193 |
| **FCG** | Fore Cannon Girth (cm) | 20.36 ± 0.78 | 18.8 | 21.5 |
| **BW** | Estimated Body Weight (kg) | 466.4 ± 24.62 | 429.9 | 527.9 |
| **BI** | Body Index (TP/WH) | 1.18 ± 0.03 | 1.10 | 1.22 |
| **PBI** | Profile Body Index (WH/BL) | 1.01 ± 0.02 | 0.97 | 1.07 |
| **RBI** | Relative Body Index (BL/TP) | 0.85 ± 0.02 | 0.81 | 0.92 |
| **CI** | Compactness Index (PV/WH) | 3.00 ± 0.13 | 2.77 | 3.28 |
| **DTI** | Dactyl-Thoracic Index (CP/TP) | 0.11 ± 0.004 | 0.10 | 0.12 |
| **HR** | Height Ratio (WH/CH) | 1.00 ± 0.01 | 0.99 | 1.03 |

### 3.2. Statistical Analysis and Interpretation

PCA allowed the reduction in the initial seven variables into two principal components, explaining 74.2% of the total variance (Figure 1). The correlation circle shows that the variables WH and CH (correlation coefficient r = 0.92), on one hand, and BW and CG (r = 0.94), on the other, are strongly correlated with each other and contribute mainly to Axis 1, suggesting a gradient related to trunk measurements. Axis 2 is primarily structured by the variable HL, associated with head height.

### 3.3. Comparative Analysis with Other Studies

This result aligns with previous studies (Table 2) indicating that chest girth is a key determinant of body mass in equines [5].

The differences in morphometric traits highlight the influence of breeding selection, where certain physical traits are favoured to enhance performance and aesthetics in Fantasia events. The high variability in body length and chest girth compared to withers height suggests differences in structural proportions among individuals, which could be linked to variations in ancestry or training regimens.

Compared to previous studies on North African horses, the Fantasia horses exhibit specific conformational traits that distinguish them from general Barb or Arab-Barb populations [6]. Their balance between height and body length, combined with a robust thoracic

perimeter, suggests an adaptation to the high-energy demands of Fantasia performances, where bursts of speed and agility are essential.

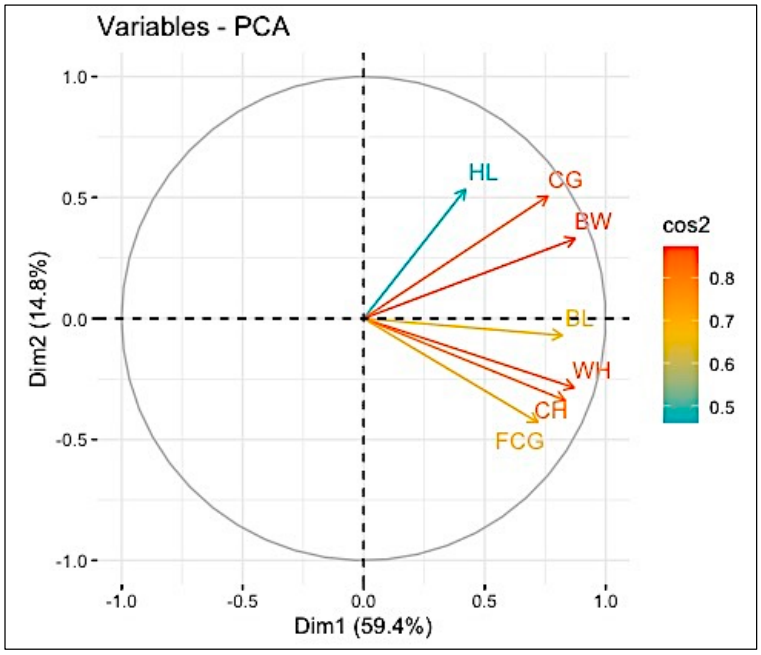



**Figure 1.** PCA correlation circle.

**Table 2.** Comparative study of body measurements in horses.

| Reference | The Present Study | [4] | [5] | [6] | [7] | [8] | Jary Cited by [4] |
|---|---|---|---|---|---|---|---|
| **Country** | Algeria (25) | Algeria (41) | Tunisia (41) | Algeria (35) | Algeria (88) | Algeria (43) | Morocco (46) |
| **WH** | 155.2 | 151.8 | 155.7 | 151.3 | 155.7 | 152.5 | 155.1 |
| **CH** | 154.5 | 151.6 | 154.9 | 150.7 | 154.7 | 150.1 | 155.9 |
| **BL** | 154.3 | 157.0 | 155.5 | 148.2 | 161.9 | 160.0 | 157.1 |
| **HL** | 60.80 | 66.6 | 67.2 | 54.6 | 47.84 | 53.1 | 66.4 |
| **CG** | 182.5 | 177.6 | 181.6 | 171.4 | 181.9 | 175.0 | 178.6 |
| **FCG** | 20.36 | 18.9 | 19.7 | 19.2 | 23.11 | 19.8 | 20.02 |
| **BW** | 466.4 | 443.6 | 433.5 | 412.7 | 453.3 | 409.9 | 423.8 |
| **BI** | 1.176 | 1.169 | 1.169 | 1.133 | 1.036 | 1.151 | 1.149 |
| **PBI** | 1.006 | 0.960 | 0.996 | 1.022 | 1.031 | 0.955 | 0.980 |
| **RBI** | 0.846 | / | / | 0.866 | 0.891 | 0.913 | / |
| **CI** | 3.005 | 2.795 | / | 2.589 | 2.003 | 2.688 | / |
| **DTI** | 0.112 | 0.106 | / | 0.113 | 0.002 | 0.113 | / |
| **HR** | 1.004 | / | / | 1.004 | 1.007 | 1.016 | / |

## 4. Conclusions

This study provides a detailed morphometric characterization of Algerian Fantasia horses, highlighting their structural uniqueness. The variability in body measurements and indices reflects breeding practices focused on aesthetic, functional, or cultural goals. Comparisons with other studies confirm that Fantasia horses, mainly of Barb and Arab-Barb lineage, exhibit distinct traits influenced by crossbreeding and selective breeding. These findings emphasize the importance of understanding their structural conformation to guide future breeding, conservation, and cultural preservation efforts.

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## References

1. Benaïssa, R.; Tamzali, Y. The current situation of Barb horses in Algeria. *Maghreb Vét.* **1988**, *3*, 21–23.
2. Kadri, A. Le cheval barbe, cheval du Nord de l'Afrique, son rôleen Algérie. *Organis. Mond. Cheval Barbe.* **2006**, *9*, 45.
3. Boujenane, I.; Touati, I.; Machmoum, M. Mensurationscorporelles des chevaux Arabe-Barbes au Maroc. *Rev. Méd.Vét.* **2008**, *159*, 144–149.
4. Rahal, K.; Guedioura, A.; Oumouna, M. Paramètresmorphométriques du cheval barbe de Chaouchaoua, Algérie. *Revue Méd. Vét* **2009**, *160*, 586–589.
5. Chabchoub, A.; Landolsi, F.; Jary, Y. Etude des paramètresmorphologiques de chevaux Barbes de Tunisie. *Rev.Méd. Vét.* **2004**, *155*, 31–37.
6. Guedaoura, S.; Cabaraux, J.F.; Moumene, A.; Tahraoui, A.; Nicks, B. Evaluation morphométrique de chevaux de race barbe et dérivésen Algérie. In *Annales deMédecineVétérinaire*; ULg-Université de Liège: Liège, Belgium, 2011.
7. Labbaci, M.; Boukraa, D.; Krim, F.; Benhammadi, M.e.A.; Gaouar, S.B.S. Morphological and genetic characterization of fantasia horse breed in Algeria by the study ofmicrosatellites. *Genet. Biodivers. J.* **2024**, *8*, 113–129.
8. Benhamadi, M.A.; Mezouar, K.; Benyarou, M.; Bouandas, A.; Gaouar, S.B.S. Morphometric characterization of the equine barbe breed in northwest of Algeria. *Genet. Biodivers. J.* **2017**, *1*, 48–65. [CrossRef]

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