Revista Brasileira de Zootecnia

Performance of horses of Mangalarga Marchador breed: man and animal relations

Geruza Cardoso da Silva[1] (iD), **Cinara da Cunha Siqueira Carvalho[1*]** (iD), **Maria Dulcinéia da Costa[1]** (iD), **Raul Herberth Freitas Rocha[1]** (iD), **Jordana Carvalho de Menezes[1]** (iD), **Ignacio Aspiazú[1]** (iD), **Jéssica Duarte Ramos Fonseca[1]** (iD), **Hugo Pereira Santos[1]** (iD)

[1] Universidade Estadual de Montes Claros, Janaúba, MG, Brasil.

*Corresponding author:
cinarasiqueira@yahoo.com.br

How to cite: Silva, G. C.; Carvalho, C. C. S.; Costa, M. D.; Rocha, R. H. F.; Menezes, J. C.; Aspiazú, I.; Fonseca, J. D. R. and Santos, H. P. 2019. Performance of horses of Mangalarga Marchador breed: man and animal relations. Revista Brasileira de Zootecnia 48:e20180151. https://doi.org/10.1590/rbz4820180151

ABSTRACT - The objective of this study was to evaluate the effect of the trainer and the adopted daily work on the behavior and performance of horses of the Mangalarga Marchador breed on a horse farm and in racetracks in northern Minas Gerais State, Brazil. Twenty equines and nine trainers from four farms and three competition events of the breed were observed. The experiment was divided into two stages. In the first stage, the animals were observed together with their trainer on the farm, during the daily work, and the behavior reactions were recorded based on scores. The duration of training and the behavior told by the trainer of the animal were recorded in scores. The second stage happened in three competitions of the breed in agricultural fairs. The same observations were made on horse farms, including the behavior of the animal, before and after the trial, as well as the emotional state in the same period. For data analysis, multivariate statistics were used based on the principal components and factor analysis, using the statistical software R (version 3.3.2). From the data analyzed, it was verified that the variables embouchure, behavior and voice of the presenter, and reward and incentive in the competition influenced the reactivity of the animal. Variables of human behavior in training influenced the animal behavior variables in training. The behavior of the trainer and the form of the training, as well as the fact that the trainer is the presenter, interfered in the behavior of the horses on the horse farm and in the competitions, resulting in safer animals. However, the need for time adaptation and training management is necessary for the whole man × animal relation to get better rankings in the race competitions.

Keywords: equines, factorial analysis, principal components, specialized competitions, trainers

Introduction

Among the horse breeds raised in Brazil, the Mangalarga Marchador, which is originally national, has well characterized walk and trot, which gives it prominence in the judgment tracks in national and international fairs (Rezende et al., 2016).

The Mangalarga Marchador is a medium-sized equine, with balanced longitudinal and vertical measurements, which are ideal conditions for the intended function of the animal, whether saddle, sport, or traction. The suitability of the animal for each activity to which it is requested is derived from its morphological measures and proportions between them (Cabral et al., 2004).

2

Performance of horses of Mangalarga Marchador breed: man and animal relations
Silva et al.

When used for breeding for genetic transfer, besides morphological measures, its temperament and the relation with man are also determinant factors when choosing the animal. However, success in its performance is related to the interaction with the trainer, which is dependent on the behavioral reactions of both, besides the experience of the animal acquired through previous contact with the human being (Hausberger et al., 2008; Honorato et al., 2012). Equine temperament and management of the trainer reflect on the degree of welfare and good animal-man relationship (Calviello et al., 2015).

Therefore, it is now imperative to evaluate the relationship between trainer and animal to provide well-being to both and improvements in the performance of horses on the runway. Knowing this market need, this unpublished work evaluated the effect of the trainer on behavior and performance of Mangalarga Marchador horses on farms and in competitions in agricultural fairs.

Material and Methods

The procedures performed in this experiment were approved by the Ethics Committee on Experimentation and Animal Welfare (CEEBEA; case no. 093/2016) and Ethics Committee on Human Experimentation (case no. 2,518,797).

The experiment was carried out in two stages. Initially, the training of equines was monitored in private farms and, afterwards, the conduction and responses of the same animals were evaluated in competition events of the Mangalarga Marchador breed.

In the first stage, activities were followed in four farms located in the northern region of Minas Gerais. Horse farm 1 is situated in the municipality of Mato Verde, farm 2 in Janaúba, and farms 3 and 4 in Montes Claros.

Twenty Mangalarga Marchador animals were observed, seven males and 13 females, between 14 and 124 months, with an average age of 48 months. There were six pulled foals and 14 mounted horses.

Observations occurred during the days in which the animals were being trained on the farm. Data collection on the farm began at the time the animals were being prepared for training until the end of training. Each farm was visited twice, totaling two weeks of observations on each property.

Observations regarding behavior on the farms were daily work, and reactions (social and emotional behavior) during the daily work were characterized by scores (Table 1).

Trainers were questioned about the temperament of the horses on the farms according to the following scores: 1- calm; 2- agile; 3- nervous; 4- agitated; 5- stubborn; 6- scared; and 7- slow. This scale was stipulated according to the responses obtained from the trainers.

Nine trainers were observed, four of them from farm 1, one from farm 2, three from farm 3, and one from farm 4. Each trainer was identified according to the animal to which he was responsible during the training both on the farm and on the track, and might or might not be the presenter of this animal.

Table 1 - Score of the variables used to evaluate the daily work

Observation	Score 1	Score 2
Training or trial schedule	Daytime	Night time
Training or trial duration	≤ 2 h of training	> 2 h
Response to commands	Quick response without mouthpiece	Slow response without mouthpiece
Aggressive attitudes	Kick or headbutt	No agressiveness
Escape attempts	Dodge or attempt to flee the training site	No escape attempt
Agitated animal	Restless animal	Calm animal
Temperament of the animal	Positive reactivity	Negative reactivity
Physical appearance of the mouth	No injury	Injured

3

Performance of horses of Mangalarga Marchador breed: man and animal relations
Silva et al.

However, it was recorded, in spreadsheets, if the animal at the time of presentation was conducted by the trainer of the destination farm or by another trainer present at the event site.

Trainers were observed during the daily work period of the animals, noting their adopted behavior so that they obeyed their commands. These behaviors were classified according to the scores described in Table 2.

A questionnaire (Table 3) was applied to each trainer to characterize the social-emotional profile with questions about age, marital status, number of children, schooling, what led him to work with horses, time working with horses, if he already conducted some training course, and number of participations in competitions of this breed. The age factor was stratified as follows: trainers aged 16 to 20 years, 21 to 25 years, 26 to 29 years, 30 to 34 years, and above 34 years.

The second part of the experiment was carried out in three Mangalarga Marchador competitions aimed at classifying the best animals for participation in the Mangalarga Marchador National Horse Show in Belo Horizonte (MG). The first event attended was the 15th Specialized Exhibition of Mangalarga Marchador Horse in Montes Claros, MG, on April 27-29, 2017; the second was the 2nd Salinas Specialized Exhibition, held on May 11-13, 2017; and the third event was the 13th Janaúba Specialized Exhibition, from June 08 to 10, 2017.

In competitions, observations began the instant the animals were being prepared in the bays, during the placement of the saddle or halter, at the entrance to the lane, during competition, and at the exit of the runway.

The observations regarding the behavior in the competitions were the same observed on farms with the same scores described in Table 1.

Table 2 - Score of trainers during daily work

Observation	Score 1	Score 2
Mouthpiece placement	Smooth	Agressive
During training the animal receives aversive management	Yes	No
Voice command	Soft voice	High voice
Give the animal a treat after or during daily work	Yes	No
Cuddling on the animal	Yes	No
Temperament of trainer during daily work	Calm	Anxious
Correct performance on the functional test	Yes	No

Table 3 - Socio-educational questionnaire

Item
1. Gender:
2. Age:
3. Marital status:
4. Place of birth:
5. Number of children:
6. You currently: ( ) Work and study ( ) Only work
7. What is your main job or occupation?
8. What is your maximum level of education?
9. What was the main reason you chose to work with equines?
10. Did your father or anyone in the family work or still works as an equine trainer?
11. How long have you been working as an equine trainer?
12. Have you ever taken any professionalizing training course on the daily work of horses?
13. If you've never taken a course, would you like to?
14. How many trials of this breed have you joined as a trainer?

4

Performance of horses of Mangalarga Marchador breed: man and animal relations
Silva et al.

The observations regarding the behaviors in the competitions were behavior before entering the track and when leaving the track (according to information given by the presenter of the competition), using a scale with the following scores: 1- calm; 2- agile; 3- nervous; 4- agitated; 5- stubborn; 6- frightened; and 7- slow.

The presenters were observed during the competition of the animals for their adopted behavior so that the horses obeyed their commands. These behaviors were classified according to the scores that are the same described in Table 2, adding the following score:

Correct performance of the functional test: score 1: yes and score 2: no.

Presenters were asked to state their emotional state before and after leaving the runway, according to the following scores: 1- happy; 2- confident; 3- quiet; 4- stressed; 5- sad; 6- shame; and 7- tired.

During the period when animals and trainers were on the farms and in the judging events, the aim was to characterize behavior and social and emotional performance of both, besides behavioral responses of animals as a function of management actions adopted by the trainers.

For the statistical analysis of animal behavior and trainer scores, a multivariate analysis of principal components and factorial analysis were performed using the statistical software R (version 3.3.2). Some variables were discarded following the collinearity criterion among the studied variables, with the correlation matrix following the varimax rotation model for factor rotation.

A value greater than 0.200 of the scores obtained was chosen for a better interpretation of the results that were the answers responsible for the principal components.

The commonalities represent how much of the variation of the trait is explained by the number of factors being considered, to identify each factor. The individual factorial weights were considered in this experiment, and the weights with values from ±50 were selected as significant (Morrison, 1976).

Results

Regarding the profile of the trainers, 45% of trainers were aged between 16 and 20 years, 22% between 21 and 25 years, 11% with 26 and 29 years, 11% with 30 to 34 years, and 11% with more than 34 years of age. Regarding the time involved in activities with equines, 22% of the trainers have less than one year of experience, 11% more than two years, 11% more than four years, and 56% more than five years. Thirty-three percent of the respondents are married, 33% have children, 11% are illiterate, 22% have completed high school, and 33% still study. When asked why they work with horses, 45% of the trainers answered that it was interest, 22% was influenced by friends who already work in the area, and 33% because of the influence of family members who work or worked with horses.

Of these trainers, 67% have already done some course related to daily work and presentation of Mangalarga Marchador horses, 11% never participated in any trial, and 11% participated only once. With regard to participation in events, 78% have already been participants in more than five trials of the breed.

The main correlations analyzed between the variables of animal and trainer on farms are presented in Table 4.

The variables related to animal on farm and trainer on the farm are not correlated with variables related to animal in competition and trainer in competition. Most of the correlated values were low, that is, the way the animal acted in the daily work did not influence in the way it behaved in the competition. However, some correlations presented moderate values (Table 5).

Some variables of animals in competition and presenter in competition presented high correlations (Table 6).

The analysis of principal components grouped the 36 studied variables in five principal components, which explain 78.80% of the total variation.

The principal component 1 is formed by the variables of animal in competition and presenter in competition ($Z_1 = -0.262$EVENT; -0.227AGRE.C; -0.229MPC; -0.230BEHA.P; -0.216VOICP; -0.226REW.C; -0.206CUDD.C; -0.222TEST.P), which explains 46.15% of the total variation (Table 7; Figure 1).

The principal component 2 is formed by the variables of animal on farms and trainer on farms ($Z_2 = -0.292$COMR.T; -0.261AGRE; -0.295ESCAT; -0.279REACTT; -0.298MPF; -0.281BEHA.TF; -0.282TVOI; -0.283REWT; -0.265CUDD.T) and explains 18.95% of total data variation (Table 7). The behavior of the man in daily work reflected in the behavior of the animal in daily work.

The principal component 3 associates the variables of the trainer on farms, animal in competition, and presenter in competition ($Z_3 = 0.490$TRAI; 0.443PRES; -0.288MORPH; -0.303BEHA.A; -0.244EMO.BP) and explains 5.81% of the total variation (Table 7). Changing the trainer during the presentation reflected negatively on the behavior of the animal in the competition.

The principal component 4 is formed by the variables animal on farms, trainer on farms, and animal in the competition ($Z_4 = -0.554$T.SAIDT; 0.283AGE.T; -0.375MARCHA; 0.342FUNCT; -0.256BEHA.A) and represents 4.56% of the total variance (Table 7). According to the data obtained, the younger trainers

Table 4 - Correlations between the behaviors of animal and trainer observed on farms

Observed variable	RCOM	AGRE	ESCAT	REACT
MOUTHP.F	0.8535	0.8416	0.9133	0.8022
BEHA.TF	0.8429	0.7908	0.8074	0.8063
TVOI	0.8861	0.7850	0.8031	0.9006
REW.T	0.8279	0.8794	0.8895	0.7956
CUDD.T	0.7394	0.7586	0.6888	0.6583

RCOM - response to commands; AGRE - aggressiveness; ESCAT - escape attempt; REACT - reactiveness; MOUTHP.F - mouthpiece on farm; BEHA.TF - trainer behavior on farm; TVOI - voice tone; REW.T - reward; CUDD.T - cuddling.

Table 5 - Correlations between animal and trainer variables on farms with animal and presenter variables in the competition

Observed variable	TRAI	AGE.T	DURT
PRES	0.6946	0.2575	0.0650
DUR.P	0.4314	0.3250	0.2627
AGE.A	0.2934	0.4037	0.2051
EMO.AP	0.0839	0.1676	0.4317

TRAI - trainer; AGE.T - age of trainer; DURT - duration of training; PRES - presenter; DUR.P - duration of presentation; AGE.A - age of animal in each competition; EMO.PA - emotional state after presentation.

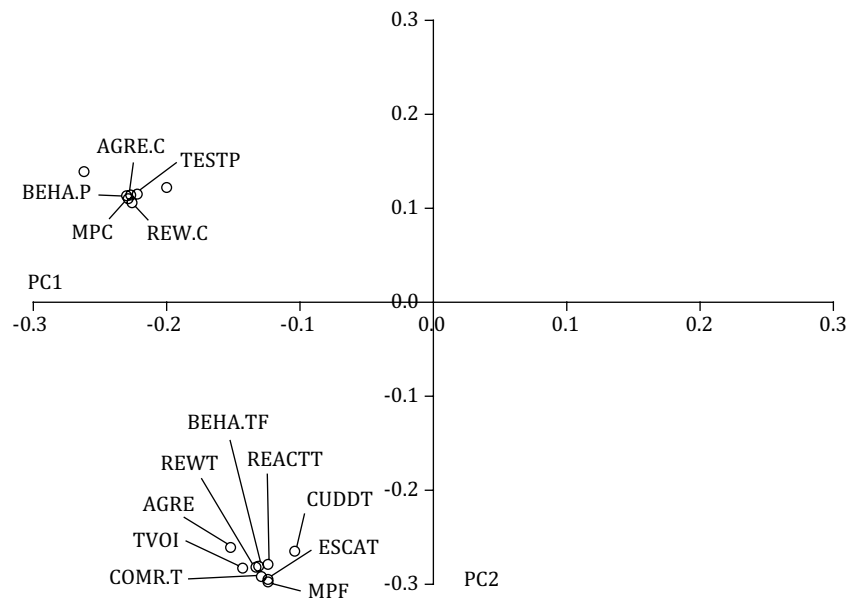**Table 6 -** Correlations between animal and presenter in competition

Observed variable	EVENT	AGE.A	PRES	DAYC	DUR.P	ACOM	AGRE.C	ESCAP	REACT.C
MOUTHPC	0.7487	0.6652	0.6118	0.7881	0.6981	0.7992	0.9681	0.8582	0.8026
BEHA.P	0.7487	0.6797	0.6512	0.8084	0.7176	0.7992	0.9681	0.8582	0.8026
VOICP	0.6119	0.5553	0.5265	0.7656	0.6106	0.8121	0.8891	0.8008	0.7966
REW.C	0.7007	0.6499	0.6576	0.8021	0.6859	0.8267	0.9444	0.8565	0.8252
CUDD.C	0.5422	0.5314	0.6208	0.7366	0.7120	0.7961	0.8228	0.7477	0.7659
TEST.P	0.7131	0.6208	0.6373	0.8156	0.6803	0.8296	0.9263	0.8387	0.8357

EVENT - competition event; AGE.A - age of animals in each competition; PRES - presenter; DAYC - competition day; DUR.P - duration of presentation; ACOM - command response in the presentation; AGRE.C - aggressiveness in competition; ESCAP - escape attempt during presentation; REACT.C - reactivity in competition; MOUTHPC - mouthpiece in competition; BEHA.P - behavior of presenter; VOICP - voice tone of presenter; REW.C - reward in competition; CUDD.C - cuddling in competition; TEST.P - presenter during functional test.

Table 7 - Coefficients of observations animal and trainer/presenter on farms and in competitions

Variable	Coefficient				
	PC1	PC2	PC3	PC4	PC5
DURT	−0.121	−0.169	−0.193	−0.120	
COMR.T	−0.129	−0.292			
AGRE	−0.152	−0.261			
ESCAT	−0.124	−0.295			0.103
REACTT	−0.124	−0.279		0.105	
T.SAIDT				−0.554	
TRAI			0.490	−0.141	−0.184
AGE.T	−0.125	−0.185	0.121	0.283	
MPF	−0.124	−0.298			
BEHA.TF	−0.131	−0.281		0.117	
TVOI	−0.133	−0.282			
REWT	−0.143	−0.283			
CUDDT	−0.104	−0.265	−0.190	−0.116	
EVENT	−0.262	0.139			−0.132
AGE.A	−0.161			0.220	−0.403
PRES	−0.154		0.443	−0.129	−0.149
CDAY	−0.200	0.122		0.139	0.107
DUR.P	−0.174		0.189	−0.136	−0.129
COMR.P	−0.199			0.142	0.313
AGRE.C	−0.227	0.114			
ESCAC	−0.202	0.109			0.205
REACT.C	−0.198		0.101	0.149	0.322
MORPH	−0.179		−0.288		
MARCHA	−0.145		0.167	−0.375	
FUNCT	−0.139	0.118		0.342	−0.298
GERL	−0.178		−0.215		−0.253
BEHA.B	−0.126			−0.168	0.241
BEHA.A	−0.149		−0.303	−0.256	−0.156
MPC	−0.229	0.110			
BEHA.P	−0.230	0.113			
VOICP	−0.216				0.202
REW.C	−0.226	0.106			
CUDD.C	−0.206				0.143
TEST.P	−0.222	0.115			
EMO.BP	−0.179		−0.244		−0.162
EMO.AP	−0.151		−0.248		−0.331

DURT - duration of training; COMR.T - command response of training; AGRE - aggressiveness; ESCAT - escape attempt; REACTT - reactivity; T.SAIDT - temperament said by trainer; TRAI - trainer; AGE.T - age of trainer; MPF - mouthpiece on farm; BEHA.TF - behavior of trainer on farm; TVOI - voice tone; REWT - reward; CUDDT - cuddling; EVENT - competition event; AGE.A - age of animal in each competition; PRES - presenter; CDAY - competition day; DUR.P - duration of presentation; COMR.P - command response in presentation; AGRE.C - aggressiveness in competition; ESCAC - escape attempt in competition; REACT.C - reactivity in competition; MORPH - morphology; MARCHA - marcha; FUNCT - functional test; GERL - general classification; BEHA.B - behavior before competition; BEHA.A - behavior after competition; MPC - mouthpiece in competition; BEHA.P - behavior of trainer; VOICP - voice tone of presenter; REW.C - reward in competition; CUDD.C - cuddling in competition; TEST.P - presenter in functional test; EMO.BP - emotional state before presentation; EMO.AP - emotional state after presentation.

COMR.T - response to commands; AGRE - aggressiveness; ESCAT - escape attempt; REACTT - reactivity; MPF - mouthpiece on farms; BEHA.TF - behavior of trainer on farm; TVOI - voice tone; REWT - reward; CUDDT - cuddling; AGRE.C - aggressiveness in competition; MPC - mouthpiece in competition; BEHA.P - behavior of presenter; REW.C - reward competition; TEST.P - presenter in functional test.

Figure 1 - Schematic representation of the first (PC1) and second principal component (PC2) of the analysis of animal and man behavior on farms and in competitions.

had a negative influence on the animal temperament (in the trainer's view in the training) and reflected negatively on the marcha test and on the behavior of the animal when leaving the runway.

The principal component 5 associates animal variables in the competition and presenter in the competition ($Z_5 = -0.403$ AGE.A; 0.313COMR.P; 0.205ESCAC; 0.322REACT.C; -0.253GERL; 0.241BEHA.B; -0.331EMO.AP), explaining 3.33% of total variance (Table 7). The attempt to escape, the reactivity of the animal, and the response to commands at the presentation had a negative influence on general classification of the animal and emotional state of the presenter. Overall, only 38% of the animals were ranked first and second, and 36% of the presenters reported leaving the competition stressed, while 21% reported feeling tired, sad, or embarrassed.

The factorial weights and similarities of observations of animals, trainers, and presenters were grouped into two factors (Table 8). In the first factor, called man × animal set, the variables of animal and presenter in competitions during all considered competitions are encompassed. The analyzed values were significant. In the second factor, called man × animal interaction, the variables related to both animal and trainer on the farm are grouped. The behavior of the animal in the view of the trainer and the trainer himself showed low values; therefore, these variables did not enter this group.

Discussion

Analyzing the profiles of the trainers, most have always had an interest in working with horses. Family influence was also a justifiable reason to go on with the activity, but in some cases, family responsibility or the only employment opportunity was reported.

Most of the respondents are young, with an average age of 27 years. Thirty-three percent did not take the basic course for presentation and daily work of the breed, and this is due to the fact that 33% have been working with equines for a little more than two years.

The reaction of the animal during daily work was influenced by the behavior of the trainer (Table 4). The placement of the bit mouthpiece, when done in a careful and disciplined way, optimized the reduction

8

Performance of horses of Mangalarga Marchador breed: man and animal relations
Silva et al.

Table 8 - Factorial weights and commonalities of observations of animal and trainer/presenter on farms and in competitions

Variable	Factor		Commonality
	Man × animal set	Man × animal interaction	
DURT	0.225	0.620	0.44
COMR.T	0.103	0.921	0.86
AGRE	0.225	0.893	0.85
FUGAT	0.080	0.918	0.85
REACTT	0.102	0.883	0.79
T.DITOT	0.113	0.346	0.13
TRAI	0.219	0.412	0.22
AGE.T	0.221	0.665	0.49
MPF	0.080	0.925	0.86
BEHA.TF	0.123	0.898	0.82
TVOI	0.128	0.905	0.84
REWT	0.166	0.928	0.89
CUDDT	0.050	0.811	0.66
EVENT	0.753	−0.010	0.57
AGE.A	0.682	0.119	0.48
PRES	0.633	0.147	0.42
CDAY	0.837	0.090	0.71
DUR.P	0.705	0.189	0.53
COMR.P	0.820	0.184	0.71
AGRE.C	0.956	0.175	0.94
ESCAP	0.862	0.138	0.76
REACT.C	0.821	0.192	0.70
MORPH	0.698	0.240	0.54
MARCHA	0.656	0.174	0.36
FUNCT	0.644	−0.010	0.41
GERL	0.708	0.211	0.55
COMP.A	0.573	0.010	0.33
COMP.F	0.657	0.060	0.44
EMBOC	0.959	0.187	0.96
COM.AP	0.964	0.181	0.96
VOICPA	0.881	0.220	0.82
REW.C	0.942	0.191	0.92
CUDD.C	0.845	0.203	0.75
TEST.P	0.938	0.162	0.91
EMO.AA	0.702	0.232	0.55
EMO.PA	0.642	0.103	0.42
Mean			0.65

DURT - duration of training; COMR.T - command response; AGRE - aggressiveness; ESCAT - escape attempt; REACTT - reactivity; T.SAIDT - temperament said by trainer; TRAI - trainer; AGE.T - age of trainer; MPF - mouthpiece on farm; BEHA.TF - behavior of trainer on farm; TVOI - voice tone; REWT - reward; CUDDT - cuddling; EVENT - competition event; AGE.A - age of animal in each competition; PRES - presenter; CDAY - competition day; DUR.P - duration of presentation; COMR.P - command response in presentation; AGRE.C - aggressiveness in competition; ESCAC - escape attempt in competition; REACT.C - reactivity in competition; MORPH - morphology; MARCHA - marcha; FUNCT - functional test; GERL - general classification; BEHA.B - behavior before competition; BEHA.A - behavior after competition; MPC - mouthpiece in competition; BEHA.P - behavior of trainer; VOICP - voice tone of presenter; REW.C - reward in competition; CUDD.C - cuddling in competition; TEST.P - presenter in functional test; EMO.BP - emotional state before presentation; EMO.AP - emotional state after presentation.

9

Performance of horses of Mangalarga Marchador breed: man and animal relations
Silva et al.

of undesirable reactions during daily work; the animal behaved more calmly, responding quickly to the commands of the trainer. When the mouthpiece was placed without care and with changed voice, the animal attempted to escape.

Horses of the Mangalarga Marchador breed are animals of elegant size, plastic beauty, docile temperament, and properness for mounting (ABCCMM, 2018). This docility of the breed favored good behavior, since the variable behavior of the trainer was positive, presenting an excellent correlation when the trainer did not punish the animal and did not hit it, contributing to the utilization of training and satisfaction of the trainer, who had a more calm and obedient animal (Table 4).

During the conduction of the experiment, we verified that some trainers treated the animals before the training with honey. For some animals, it was given straight into the mouth shortly after the insertion of the bit mouthpiece, as a way to relax it. There was also the case that the reward happened after the training, in the form of hugs, kisses, and brushing the hair of the animal, demonstrating that the training was satisfactory and that there was an improvement of the animal. The affection, expressed in the way of brushing, cleaning the animal, hugging, showing confidence, encouraging the animal, and rewarding with candy, can favor the demonstration of positive behaviors, motivating the animal to carry out the course correctly and abandon the error.

Reactivity and response to commands occur as a reflex to the tone of the trainer's voice. Trainers commonly scream when the animal does not respond to commands. Merkies et al. (2013) reported that horses show less distress and/or calm down when the trainer is around and speaks in a pleasant voice, but they are more resentful if the voice tone is severe. In this work, the trainers did not alter the voice tone to direct and to teach certain behavior to the animal, while these, in turn, responded promptly.

Moderate values (Table 5) indicate that the trainer had influence when he was also the presenter during the competition, so that when the same person remained in the competition, the animal felt more confident and safer in a different environment. Variability in duration and daily work are important aspects to ensure a good presentation of the animal; however, the duration of the presentation leads to the fatigue of the trainer/presenter and may discourage the animal.

In addition, without the proper physical conditioning, the competing animal may quickly appear tired and exhausted. Training duration must be respected and limited to the same period that the animal remains on the competition track.

Abrantes et al. (2015) evaluated the period demanded for application of the protocol suggested by the Brazilian Association of Mangalarga Marchador Horse Breeders (ABCCMM) by the evaluation of eight mares aged three to five years, in which the 1-h training per day was adopted. The researchers concluded that the time set in the protocol is appropriate to condition horses to compete in marcha events following the ABCCMM rules without fatigue. According to the ABCCMM (2018), the animals must be conditioned for a marcha contest of approximately 20 to 70 min, as required by the rules. In this study, the mean training time was 72 min, explaining the recommendations of the ABCCMM Protocol, but variation occurred in the minimum time of 18 min and maximum of 2 h and 35 min. This lack of standardization of training time can elevate cortisol and expose animals to physical stress conditions (Rezende et al., 2014; Lopes et al., 2009). In competitions, the average time was 51 min.

The correlation variables of animal and man in the competition were similar to the correlation variables of animal and man on the farms, emphasizing the importance of the trainer being the presenter in competition tracks. This reaffirms the great importance that man has on the animals, with his positive attitudes reflecting positively on their joint actions. The functional test of the presenter indicates that both man and animal, when trained, have a great presentation and, consequently, a good classification.

Of the 36 principal components analyzed, five explain 78.80% of the total variance. The highest expression component in the multivariate analysis was the principal component 1, which deals with the competition. The characteristic of the Mangalarga Marchador breed means that these animals specialize in competition participations. The marcha, characteristic of Mangalarga Marchador horses,

10

Performance of horses of Mangalarga Marchador breed: man and animal relations
Silva et al.

results from neuromotor coordination of the movements, training, and appropriate morphometric measures conferred to the breed (Pinto et al., 2005).

However, as these horses are docile animals (natural temperament of the breed), when they receive proper placement of the mouthpiece, with reward and cuddling during competition, these actions tend to make the animal calmer. Thus, if the trainer adopts a rational behavior (reactivity, proper mounts, and voice tone), he can execute the functional test successfully.

The contact of trainer with animal starts at the moment he inserts the mouthpiece, so this activity deserves attention as it directly influences the behavior of the animal and the occurrence of injuries. The use of mouthpieces predisposes the horse to mandibular lesions, dental problems that can compromise the inner cheek, and labial commissure, causing ulcerations and hematomas (Araripe et al., 2013).

The variables of greater weight in the principal component 2 express the importance of good behaviors of the trainer that, when associated to moderate voice tone, careful mouthpiece placement, and reward offering such as honey and cuddling, resulted in better responses of the animal to the command and a reduction of aggressive attitudes. In this work, it is verified that few aversive attitudes were adopted. Punishment is associated with emotional responses, such as fear and frustration in the punished animal, and decreases learning capacity of equines (Lindsay, 2000; Kratzer et al., 1977).

The fact that the trainer is the presenter reflects positively on the morphology test, as the interaction between animal and human is consolidated since the farm. Thus, both finish the test with safety and satisfaction. Otherwise, when the presenter is not the trainer, he feels more insecure or does not feel comfortable with the unknown animal. In this case, as the interaction is not positive, the execution of the test and exit of the competition are not satisfactory (principal component 3). When entering the runway, 31% of the animals presented calm behavior, while at the exit 36% were agitated, probably due to the adrenaline released during the competition.

In relation to the observed factors, in the principal component 4, it is possible to understand that, if the trainer is young and has little experience, he does not have perception of the temperament of the animal and, consequently, of the efficiency of daily work. This reflects negatively on the marcha test, in which a greater dominance over posture, marcha, and positioning of animal and presenter are necessary. The inexperience of the trainer even leads him to understand that the animal is agitated by the lack of success of both in conducting the race.

An adult animal, experienced in participating in events of the breed, has greater ease of responding to commands and is safer to enter the competition. It tends to decrease escape attempt and is less agitated. This experience of the animal, associated with good presenter conduct, leads it to develop a satisfactory emotional state, and so there is the possibility of conquering the classification.

For the factor analysis, the first factor called "man and animal in competition set" (Table 8) expresses the weight of the effects that stand out as mouthpiece placement (98%), presenter behavior on the runway (98%), competition reward (30%), cuddling (50%), performance of the presenter in the functional test (89%), and animal aggressiveness (95%) on the runway.

The second factor, identified as "man × animal interaction" during training, expresses the beneficial effects of rational management. During the daily work, all trainers on all farms talked to the animals, 100% called horses by their names, since care was taken when placing the mouthpiece (90%), the low voice tone (72%) and adoption of the reward (30%) encourage the animal to reduce the attempt to escape from daily work (90%), conditioning it to good and quick command responses (76%).

McGrogan et al. (2008) obtained results by means of classification forms, in which 100 horses were characterized according to their personality using adjectives based on their owners and trainers, and three factors explained 59% of the variance, the personalities of horses of various races.

When factors 1 and 2 are adopted positively, that is, given the precepts of rational management, the animal tends to be well classified. In this work, the classification occurred as follows: 26% reserved champions and 12% champions of the race in its category.

11

Performance of horses of Mangalarga Marchador breed: man and animal relations
Silva et al.

Conclusions

The behavior of trainer and the form of daily work, as well as the fact that the trainer is the presenter interfered in the behavior of horses on farms and in competitions, resulting in safer animals. However, it is necessary to adapt the time and management of the daily work so that man and the animal get better rankings in competitions of the breed.

Acknowledgments

References

Abrantes, R. G. P.; Rezende, A. S. C.; Santiago, J. M.; Trigo, P.; Melo, M. M.; Fonseca, M. G.; Lage, J. and Moreira, D. C. A. 2015. Validation of a training protocol for marcha contests of the Mangalarga Marchador breed. Bioscience Journal 31:1787-1791.

Araripe, M. G. A.; Castelo-Branco, D. S. C. M. and Nunes-Pinheiro, D. C. S. 2013. Alterações anatomopatológicas na cavidade oral equina. Acta Veterinaria Brasilica 7:184-192.

ABCCMM - Associação Brasileira dos Criadores do Cavalo Mangalarga Marchador. 2018. Regulamento geral para eventos oficializados do cavalo Mangalarga Marchador. Belo Horizonte. Available at: <http://leia.abccmm.org.br/portal/regulamentos/regulamentoeventos>. Accessed on: Jan. 04, 2018.

Cabral, G. C.; Almeida, F. Q.; Azevedo, P. C. N.; Quirino, C. R.; Santos, E. M.; Corassa, A. and Pinto, L. F. B. 2004. Avaliação morfométrica de eqüinos da raça Mangalarga Marchador: medidas angulares. Revista Brasileira de Zootecnia 33:1790-1797. https://doi.org/10.1590/S1516-35982004000700017

Calviello, R. F.; Titto, C. G.; Titto, E. A. L.; Infante, P.; Leme, T. M. C. and Pereira, A. M. F. 2015. Evaluation of reactivity of horses in the presence of unknown stimulus. Brazilian Journal of Veterinary Research and Animal Science 52:167-172.

Hausberger, M.; Roche, H.; Henry, S. and Visser, E. K. 2008. A review of the human–horse relationship. Applied Animal Behaviour Science 109:1-24. https://doi.org/10.1016/j.applanim.2007.04.015

Honorato, L. A.; Hötzel, M. J.; Gomes, C. C. M.; Silveira, I. D. B. and Machado Filho, L. C. P. 2012. Particularidades relevantes da interação humano-animal para o bem-estar e produtividade de vacas leiteiras. Ciência Rural 42:332-339. https://doi.org/10.1590/S0103-84782012000200023

Kratzer, D. D.; Netherland, W. M.; Pulse, R. E. and Baker, J. P. 1977. Maze learning in quarter horses. Journal of Animal Science 45:896-902. https://doi.org/10.2527/jas1977.454896x

Lindsay, S. R. 2000. Adaptation and learning. In: Handbook of applied dog behaviour and training. Iowa State University, Ames, IA.

Lopes, K. R. F.; Batista, J. S.; Dias, R. V. C. and Soto-Blanco, B. 2009. Influência das competições de vaquejada sobre os parâmetros indicadores de estresse em equinos. Ciência Animal Brasileira 10:538-543.

McGrogan, C.; Hutchison, M. D. and King, J. E. 2008. Dimensions of horse personality based on owner and trainer supplied personality traits. Applied Animal Behaviour Science 113:206-214. https://doi.org/10.1016/j.applanim.2007.10.006

Merkies, K.; MacGregor, H.; Ouimette, M.; Bogart, E. and Miraglia, K. 2013. Does the human voice have a calming effect on horses? Journal of Equine Veterinary Science 33:368. https://doi.org/10.1016/j.jevs.2013.03.110

Morrison, D. F. 1976. Multivariat estatistical methods. 2nd ed. McGraw-Hill Company, New York.

Pinto, L. F. B.; Almeida, F. Q.; Azevedo, P. C. N.; Quirino, C. R.; Cabral, G. C. and Santos, E. M. 2005. Análise multivariada das medidas morfométricas de potros da raça Mangalarga Marchador: Análise fatorial. Revista Brasileira de Zootecnia 34:613-626. https://doi.org/10.1590/S1516-35982005000200031

Rezende, A. S. C.; Fonseca, M. G.; Jordão, L. R.; D'Angelis, F. H. F.; Almeida, M. L. M.; Queiroz Neto, A.; Ferraz, G. C. and Rivero, J. L. L. 2016. Skeletal muscle fiber composition of untrained Mangalarga Marchador fillies. Journal of Equine Veterinary Science 36:101-104. https://doi.org/10.1016/j.jevs.2015.11.005

Rezende, H. H. C.; Rezende, A. S. C.; Lana, A. M. Q.; Santiago, J. M.; Moss, P. C. B.; Moura, R. S.; Costa, M. L. L. and Melo, M. M. 2014. Bioquímica sérica e leucometria de equinos Mangalarga Marchador suplementados com cromo e submetidos à prova de marcha. Bioscience Journal 30:219-225.