BODY PART MEASUREMENT COMPARISON ON MATURE THOROUGHBRED CROSSBREED

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Abstract

The research about Body Part Measurement Comparison on Mature Thoroughbred Crossbreed Horse was conducted in the Village of Parongpong, Sub district of Cisarua, of West Bandung Regency. This study was held to find out the comparison of body parts measurement and feet conformational defect of mature Thoroughbred crossbreed horses. Research method used case study on 57 mature horses. The comparison was done by counting the percentage of each ideal proportion of body parts on length of body that assume 100%, while the ideal conformation condition and feet conformation defect of whole population was described by a statistical analysis. Body part compared (a = length from throat to withers) equal to (b = length from withers to croup), (d = length from withers to elbow) and (e = length from elbow to ground), (c = length from croup to dock) half length of (a), (b), (d) or (e), Length of (x = length from shoulder to knee) should longer than (y = length from knee to ground) and (m = length from stifle to hock) should longer than (n = length from hock to ground). The result indicated conformational defect of front leg comprised of splayfooted 40.35%, pigeon toed 1.75%, base wide and base narrow 5.26%, camped under 7.02%, bucked kneed 10.35%. Conformation defect of rear leg comprised of extreme cow hock and splay footed 3.51%, bow kneed and cow hock 1.75%, base wide 14.04%, base narrow 35.09%, sickle hock 35.09%, coon footed 3.51%, camped under 10.53%. Most of body parts of a, b, c, d and e compared to the criteria of ideal body part condition, it showed on good note (0.05% non-sign). Conclusions: There was no any body parts conformation of observed horses similar to description of Mc Bane and Helen (1990), however, the deviation was very small and can be tolerated. Most observed horses had normal feet form and conformation. The percentage of an ideal shoulder angle (40° - 45°) was hundred percents and the percentage of ideal pastern angle was almost hundred percents.

Key words: Body Part, Thoroughbred-Crossbred

INTRODUCTION

Horse, has been domesticated since 5000 years ago. Horse is widely used for transportation, sports, and cavalry. In 1863, Indonesian local horse began to be utilized as battle horse, carrying battle's equipments of artillery. In 1909, battle horse was initially involved in cavalry; however, only imported horses were used for cavalry troops while the local ones were purposed as carthorses. Later, after being independent, cavalry horse has further been improved. In 1953, Australian and Pakistan horses were imported gradually. Cavalry horses of Indonesian National Army have standard requirements, such as having dark hairs, being able to carry minimal 100 kg load, firmly and do not have physical deformation, good endurance, as well as technically passed as military horses. The ability to carry loads,

body proportion, and endurance of horses are greatly influenced by the function of body parts, whereas the function of body parts is affected by the condition of body conformation that consists of suit and appropriate place of body parts as well as the condition of horse feet. Deformation on horse's legs and feet will influence the movement of horse in which movement is very important on horse especially for military use. The conformation performance of a horse body differs from one to another, this is because the performance comes from genetic and environment factors.

The body parts conformation is part of quantitative traits, thus it can be measured by measuring several size of body parts, for instance the length from the throat latch to the withers that is given the symbol of (a), equal to the length from the withers to the

croup that is given the symbol of (b), equal to the length from the withers to the stomach ventral that is given the symbol of (d), equal to the length from the base of stomach to the ground that is given the symbol of (e). While, the length from the croup to the dock that is given the symbol of (c) should be half of the length of (a), (b), (d), or (e).

The angle of the shoulder that is formed between line (d) and the line from the withers to the shoulder should be in the range of 40º - 45º, whereas the angle that is formed between the fetlock, pastern, and hoof should be 45º. The length from the shoulder to knee that is given the symbol of (x) should be longer than the length from hock to the ground that is given the symbol of (n) [6].

Another body parts conformation can be seen from the condition of physical defects happened on horse feet, looking at the proportion of feet and bone shapes as they highly influence the movement abilities of a horse. The observation of horse feet can be seen from various directions: front side, besides, and back side. Horse feet must be straight and located on each appropriate body's angle. The objective of this research was to find out the comparison of body parts measurement and feet conformational defect of mature Thoroughbred Crossbreed Horse.

MATERIAL AND METHODE

The Research object were 57 heads of mature Thoroughbred crossbreed horse in the third generation (G3), they consisted of 23 heads of mares, 33 heads of castrated stallions and 1 head stallion. Their ages were from 5 years old to 17 years old. The method of breeding was grading-up as follow: ♀ Local horse was crossed to ♂ Thoroughbred, the offspring of ♀ G_1 was crossed to ♂ Thoroughbred, the offspring of ♀ G_2 was crossed to ♂ Thoroughbred, the offspring of ♀ G_3 was crossed to ♂ Thoroughbred. The crossbred had 87.5 to 93.75% of Thoroughbreds blood.

List of material: Stick meter, calipers, angle measurement tool, tape meter (cm), formatted forms, writing pad, Pencil.
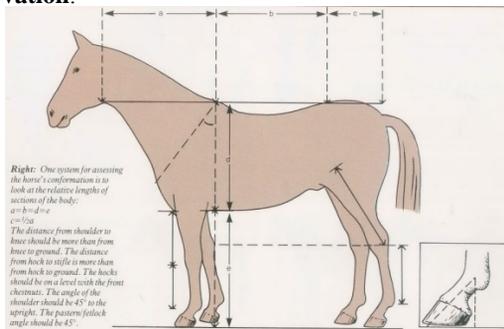
Variable of observation:

Figure 1. Horse Conformation [6]

The length of the *throatlatch* to the *withers* (a) has the same length with the *withers* to the *croup* (b), the length from the *withers* to the *stomach ventrale* (d), the length from Stomach ventral to the ground. The length from the croup to the dock must be a half of (a) or (b) or (d) or (e). *The angel of shoulder* should be 45º upright. *The pastern/fetlock angle should be* 45°. The length from *shoulder* to knee that is given the symbol of (x) must be longer than the length from the hock to the ground that is given the symbol of (n). Descriptive was used as statistical analysis. Deviation (έ) was the difference between expectation value (e), and observation (o): έ = o - e, this value is divided into 3 categories: good, average, and low. The most appropriate size is that close to zero (0). The physical shape and conformation defects of feet were seen in the front side, besides, and back side. The physical shape and conformation defects are commonly found based on Graves, et al (2005) as follow: (1) splay footed, the horse feet that goes out in direction from fetlock, (2) Pigeon toed, the horse feet that goes

inside in direction from fetlock, (3) Knocked kneed, the condition of horse feet where the upside becomes thinner and the down side becomes wider, (4) Base narrow, the condition of horse feet where it becomes narrower, (5) Base wide, the condition of horse feet where the base side becomes wider, (6) Bow kneed, horse feed with the knee becomes be apart forming O shape, (7) Calf kneed, the knee of horse that is not bulge and goes inside, (8) Buck kneed, the horse knee that is bulge out, (9) Tied in, the size of cannon bone is not proportional, (10) Cow hocked, the right and left hock get close each other and almost form splay footed, (11) Extreme cow hocked, the condition of hocked where they are getting close and clearly form splay footed, (12) Coon footed,

the condition of horse feet that having too long pastern so that the angle is not 45º, (14) Camped under. The condition of horse feet under the body that is not in line between the upper and the base of feet.

RESULTS AND DISCUSSIONS

The data description of body parts sizes shows the illustration of all data of length on (a), (b), (c), (d), (e), (x), (y), (m), and (n) which measured from 57 mature horses, thus, it can be known the horses which having ideal criteria of body parts conformation as described [6]. Data description resulted from measuring relative length of body parts on 57 heads of mature horse is illustrated on the table 1 as below:

Table 1. The description of data resulted from measuring absolute length of mature horse body parts based on total population

No	Statistical Analysis	a	b	c	d	e	x	y	m	n
						cm				
1.	Mean	64.87	71.10	37.27	66.87	77.92	65.39	44.54	60.03	55.70
2.	Variance	38.94	41.70	58.00	8.58	13.97	84.42	4.20	21.02	9.46
3.	Sd	6.24	6.46	7.62	2,93	3.74	9.19	2.05	4.58	3.08
4.	Max.	78.00	88.50	51.00	79.00	85.00	90.00	53.00	69.00	62.00
5.	Min.	50.00	54.00	21.00	61.00	68.00	44.00	40.00	50.00	50.00
6.	CV	9.62	9.08	20.08	4.38	4.80	14.05	4.60	7.64	5.52

Where: N = 57 heads

According to the table above, it is seen that the length of body part (a) was not the same with (b), (e) so that in overall length of each body parts did not meet the criteria of ideal body conformation as described [6]. The average of the length of body part (e) was 77.92±3.74 cm, it was more longer than (b), which was 71.10±6.46 cm. The average of the lengths of body part (e) and (b) were longer than (d), which was 66.87±2.93 cm, and the lengths of body part (e), (b), and (d) were

longer than (a), which was 64.87±6.24 cm.

The coefficient variation (CV) showed that the condition of data population of body part (a) was 9.62%, (b) was 9.08%, (d) was 4.38%, (e) was 4.80%, (x) was 14.05%, (y) was 4.60%, (m) was 14.64%, and (n) was 5.52% in which being categorized as uniform condition [5]. The ideal condition of relative body parts from observed horses can be seen on the table as below:

Table 2. Data Description Resulted from Measuring The Relative Length of Ideal Mature Horse Body Parts Based on Total Population.

No.	Statistical Analysis	a	b	c	d	e	x	y	m	n
						cm				
1.	Mean	69.29	69.29	34.65	69.29	69.29	69.29	69.29	69.29	69.29
2.	Variance	20.59	20.59	5.15	20.59	20.59	20.59	20.59	20.59	20.59
3.	Sd	4.58	4.58	2.29	4.58	4.58	4.58	4.58	4.58	4.58
4.	Max.	78.80	78.80	39.40	78.80	78.80	78.80	78.80	78.80	78.80
5.	Min.	59.60	59.60	29.80	59.60	59.60	59.60	59.60	59.60	59.60
6.	CV	6.61	6.61	6.61.	6.61	6.61	6.61	6.61	6.61	6.61

Where: N = 57 heads

In order to get clearly observation, we present the illustration of different in the

form of histogram graph as below:
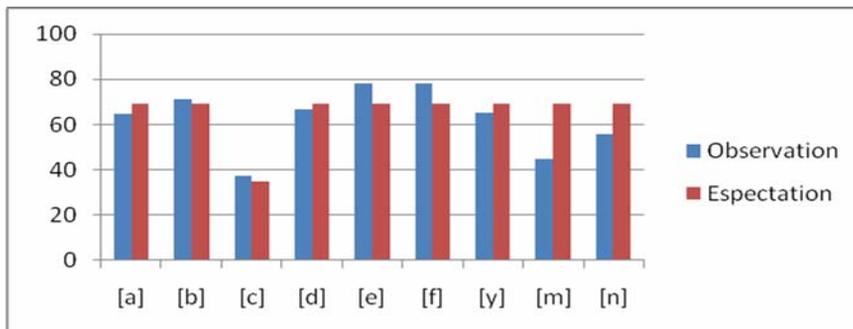
Graph 1. The different of body parts length of observed horses (blue) with ideal expectation (red)

Although the body parts condition of observed horses was not exactly the same with the ideal criteria [6], here, we tried to make three groups of horses based on the level of variance, which were good category (the variance was 0-6 cm), average category (the variance was 7-13 cm), and low category (the variance was 14-19 cm). The values above were resulted from deviation (έ) divided by three. According to the different between ideal and real conditions, it can be categorized how many percent of horses close to good, average, and low conditions as described in the table as below:

Table 3. The percentage of horse body parts sizes based on good, average, and low categories

Body parts sizes	Horse body part size					
	Good		Average		Low	
	N (heads)	Freq. (%)	N (heads)	Freq. (%)	N (heads)	Freq. (%)
(a)	38	67	18	32	1	2
(b)	42	74	15	26	0	0
(c)	32	56	21	37	4	7
(d)	50	88	7	12	0	0
(e)	19	33	26	46	12	21

As can be seen on the table above, the body parts sizes on (a), (b), (c), and (d) included in good categories having biggest percentage were the body part (a) as many as 67%, (b) as many as 74 (%), (c) as many as 56%, and (d) as many as 88%, while body part (e) having big percentage in average category as many as 46%. Based on the observation on all population of observed horses, it can be concluded that each of body part size was close to ideal condition because of big percentage in good category. Data description of horse feet conformation defect of 57 mature horses was presented on the table as below:

Table 4. The description of mature horse feet defects

Conformation defects		N (head)	(%)	Conformation defects		N (head)	(%)
Front side				Back side			
a	Front			a	Back		
	Splay footed	23	40.35		Cow Hock	1	1.75
	Pigeon toed	1	1.75		Extreme cow hock	2	3.51
	Base wide	3	5.26		Splay footed	2	3.51
	Base narrow	3	5.26		Bow kneed	1	1.75
	Bow kneed	0	0.00		Base Narrow	20	35.09
	Normal Condition	27	47.37		Base wide	8	14.04
b	Beside				Normal Condition	23	40.35
	Camped Under	4	7.02	b	Beside		
	Tied in	0	0.00		Sickle hock	20	35.09
	Calf kneed	0	0.00		Coon footed	2	3.51
	Buck kneed	6	10.53		Camped under	6	10.53
	Coon footed	0	0.00		Normal condition	29	50.88
	Normal Condition	47	82.46				

Deformed and conformation defects on horse feet is avoided, since it affects stepping, and the other movements. Good horses have straight feet like pipe [1]. A horse with sickle hock (abnormal) is easier to get several diseases such as bone spavin, bog spavin, thoroughpin, and the other weakness. Furthermore, [10] stated that right and left feet hock must be similar, if it is not symmetric; it is likely to get bone spavin, bog spavin, and thoroughpin, curb cupped hock, and swelling.

CONCLUSIONS
- There was no any body parts conformation of observed horses similar to description [6], however, the deviation was very small and can be tolerated.
- Most observed horses had normal feet form and conformation
- The percentage of an ideal shoulder angle (40º - 45º) was 100%

ACKNOWLEGMENTS

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