Genetic Parameters of Some Conformational Traits in Iraqi Arabian Horses

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Abstract

This study is conducted in private farms in Al-Diwania and Al-Najaf Provinces by using 46 progenies (both 28 males and 18 females) belonging to 5 stallions. Their ages ranged from less than 2 years to 6 years and over at the time of measurements. 14 morphological traits are taken: Withers height (WH), After withers height (AWH), Croup height (CH), Middle back height (MBH), Hip height (HH), Buttock height (BH), Dock height (DH), Body length (BL), Scapula length (SL), Arm length (AL), Croup length (CL), Shoulder joint angle (SJA), Elbow joint angle (EJA) and Croup angle (CA). All conformational trait measurements have been collected between March and June (2019) by the same trained qualified using a horse measuring stick, and goniometer. The results obtained in the current study can be summarized as follow: The females are significantly (P≤0.05) higher than males in WH, MBH, BL, CL and CA measurements. Generally all measurements of females are higher than males. The results indicate there are highly significant (P≤0.01) effect of age on all body measurements of horses, the horses of age 6 years and over have incurred higher measurements comparison with other ages. The horses with age less than two years have lowest measurements. The results of the current study can be summarized as follows: The females are significantly (P≤0.05) higher than males in WH, MBH, BL, CL and CA measurements. Generally all measurements of females are higher than males. The results indicate there are highly significant (P≤0.01) effect of age on all body measurements of horses, the horses of age 6 years and over have incurred higher measurements comparison with other ages. The horses with age less than two years have lowest measurements. The means of body measurements for horses with ages 6 years and over are 142-88 (WH), 141.04 (AWH), 144.6 (CH), 140.69 (MBH), 139.11 (HH), 135.54 (BH), 138.11 (DH), 156.11 (BL), 52.69 (SL), 43.50 (AL), 38.77 (SL), SJA (47.38), EJA (34.54) and CA (47.69) respectively. The results appear that the sires had an important source of variation, there are significant differences between the different body measurements of the sire's sons the estimates of heritability ranged from 0.002 for SL to 0.80 for BL. The highest value of heritability for BL is 0.80, CH (0.74), EJA (0.7) and is (0.52) for WH. The values of genetic and phenotypic correlations are highly significant (P≤0.01) and ranged from 0.40-0.97 and from 0.41-0.99. Simple correlation coefficients are found between BL and WH, BL and CH and WH and CH which are 0.735, 0.717, 0.907 and 0.69, 0.69 and 0.91 respectively. The highest breeding value is 2.932 for the BL and the lowest is -4.606 for BH.

1. Introduction

Iraqi horses owners always try to own the beauty horses, so many local beauty show competitions were done in the last years especially in the middle and the south cities of Iraq. To our knowledge, there are no studies on estimating the genetic parameters of some conformational traits of Arabian horses in Iraq. It is well known that beauty conformation is related to the perfect body measurements and benefit performance. Beauty conformation play an essential role in horses breeding programs. The important factors to fetch prices are good conformation and movements [1]. For subjective judging on the body conformation and as selection criteria, the body indices are good scale [2]. Generally in genetic evaluations, geometric methods can provide modern objective variables that may be used [3]. The effects of inbreeding on phenotypic and genetic values of livestock can be observed, due to the fact that the decrease in performance and functional traits may be resulted from the combination of inbred and other unfavorable conditions [4,5].

The problem is particularly clear in local small populations in which mating of relatives may often cause an increase of inbreeding level especially with Arab horses [6]. For thorough assessment of the horse, measuring the linear dimensions between various body regions must be done [7]. The relationships between the bone orientations are the angular measurements; these angles are vary among different horse breeds. To our knowledge, there are no studies on estimating the genetic parameters of some conformational traits of Arabian horses in Iraq. So, the aim of the present study is to estimate the genetic parameters of fourteen conformational traits of local Iraqi Arabian horses.
2. Materials and methods

2.1. Data collection

Data consisted of 14 morphological traits from 5 stallions and their 46 progenies (both 28 males and 18 females). Their ages range less than 2 years to six years and over at the time of measurements, lived in a private farms in Al-Diwania and Al-Najaf Provinces. All conformational trait measurements were collected between March and June 2017 by the same trained qualifier using a horse measuring stick, and goniometer. All measurements were taken from the left side. To obtain accurate measurements, each horse was placed in a forced stance on straight level floor. The linear measurements are:

1- Withers height (WH) i.e. distance between the highest point of wither and the ground.

2 - After withers height (AWH) i.e. distance between the end point of wither and the ground.

3 – Croup height (CH) i.e. distance between highest point of the croup and the ground.

4 – Middle back height (MBH) i.e. distance between the middle point of the back and the ground.

5 – Hip height (HH) i.e. distance between the tuber sacral and the ground.

6 – Buttock height (BH) i.e. distance between the buttock and the ground.

7 – Dock height (DH) i.e. distance between the base of the tail and the ground.

8 – Body length (BL) i.e. distance between the shoulder joint and the point of the tuber ischium with a sloping line.

9 – Scapula length (SL) i.e. distance between the wither and the shoulder joint.

10 – Arm length (AL) i.e. distance between the shoulder joint and the elbow joint.

11- Croup length (CL) i.e. distance between the croup, tuber and the buttock.

12 – Shoulder joint angle (SJA).

13 – Elbow joint angle (EJA).

14 – Croup angle (CA).

2.2. Statistical analysis

The results of this study are analyzed by using SAS programme[8]. Duncan test is used to compare among means of studied traits [9]. The heritability of the fourteen conformational traits is estimated depending on [10]. and genetic and phenotypic correlations among different body measurements are estimated depending on the same reference.

Figure 1. Goniometer.
3. Results and Discussion

Table 1 explains the overall means of different body measurements of Iraqi Arabian horses, these means are less than those which are noticed by previous studies by [11] in Iraqi Arabian horses and in Syrian Arabian horses by [4] and [12]; these differences may be due to that the most of horses in this study at age less than two years, but the overall means of body measurements in the current study are similar to results performed by the same previous researches especially the horses at six years age and over, in addition these results are agreed with these finding by (13) in wither height, crop height, crop length and scapula length measurements in Konin and Hucul horses. However, the body measurements vary among breeds, these differences due to breed size of sample, age classes and sex. Table 1 shows that WH , MBH , BL , CL and CA measurements of females were significantly (P≤0.05) higher than males. Generally all measurements of females are higher than males but these differences don't reach to the level of significant. Similar results in Iraqi Arabian horses have been found by [11] and [14] in wither height, crop height, crop length and head measurements in Konin and Hucul horses. In addition, these measurements are agreed with these finding by (13) in wither height, crop height, crop length and scapula measurements in Konin and Hucul horses. However, the body measurements vary among breeds, these differences due to breed size of sample, age classes and sex. The results of Table 1 indicate that females excel on males in some body measurements in Syrian Arabian horses.

Similar results are showed by [15] in pure Arabian horses. The results in Table 2 indicate there are highly significant (P≤0.01) effect of age on all body measurements of horses, the horses of age 6 years and over have inquired higher measurements in comparison with other ages. The horses with age less than two years have lowest measurements. The means of body measurements of horses with age 6 years and over are close to the results of [11] and [12] in Arabian horses. Generally, there are significant (P≤0.01) increase in body measurements of horses with age progress. [14], explain that mature Syrian Arabian horses have recorded higher measurements compared with foals. Also [16] showed that age has affected measurements in both sexes. [17] has demonstrated that age had significant effect on some body measurements in Spanish Arab horses. Similar results have been stated found by [18], [15] and [19].

Table 3 indicates that the sires had an important source of variation, there are significant differences between the different body measurements of the sire’s sons, this may be due to the individual differences among sires which called with genotypes. However, the sire has significant (P≤ 0.05) or (P≤ 0.01) effect on all measurements except (SL) and (SJL). [20], have mentioned that sire has an affection body measurements in the merges horse breed. The results in Table 4 demonstrated the estimate values of heritability for fourteen body measurements in Iraqi Arabian horses, the estimates of heritability ranged from 0.002 for SL to 0.80 for BL. The highest value of heritability are for BL (0.80) , CH (0.74) , EJA (0.7) and for WH (0.52), these values refer to the probability of selection these sires whose traits of progeny are highly heritability and individual selection can be depended on it and effective.

Similar estimates of heritability for BL are 0.72 and 0.72 by [5] and [21], and 0.58 and 0.58 for WH by [5] and [21] and 0.68 for CH by [22] and 0.07 for SL by [22] and 0.07 for SL by [23]. However; the estimate of heritability in this study of wither height is 0.52, this result is agreement with estimate of previous studies which ranged from 0.18 to 0.75 for wither height by [4] and [0.18] by [22] and [0.75] by [5] and (0.58) by [24] and (0.23) by [23]. Similar results are noticed by [25] and [26]. The difference among heritability estimates may be due to some factors such as heritability is a ratio of VA/VP, increased environmental variation, limited numbers of daughter dam pair, number of sires, age effects population size, unadjusted and adjusted data, effects of factors (sex, age, body weight, etc) estimation method. Heritability estimates tell something about the amount of progress that might be made by in selection for a particular trait. When the heritability is light, the correlation between phenotype and the genotype of the individuals own phenotype should be effective.
High heritability estimates also indicate that additive gene action is important for that traits and mating of the best with best should produce more desirable offspring equal number of progeny per sire group. Table 5 shows genetic correlation (above diagram) and phenotypic correlation (under diagram) among different body measurements. The values of genetic and phenotypic correlations were highly significant (P≤0.01) and ranged from (0.40-0.97) and from (0.41-0.99). The genetic and phenotypic correlation between (BL and WH), (BL and CH), (WH and CH) are (0.86,0.94), (0.76,0.91) and (0.96,0.99) respectively, also the genetic and phenotypic correlations between SJA and EJA, SJA and CA, EJA and CA, are (0.57,0.86), (0.76,0.75) and (0.52,0.69) respectively. These high correlations among the speed different body measurements may be due to the same genes affect these measurements so the improvement of one character will cause simultaneous changes in other characters. [24] has found in Turkish Arabian foals the phenotypic correlation between measurements at different ages are all positive, ranging from 0.22 to 0.63. [4] shows in Arabian horses that genetic and phenotypic coefficient between BL and WH, BL and CH and WH and CH are positive (0.20,0.29), (0.50,0.25) and (0.51,0.51) respectively. Also, similar results have been demonstrated by [11],[1] and [15] who have been found high simple correlations between BL and WH, BL and CH, WH and CH, which are 0.735, 0.717 and 0.951 respectively. Simple correlation coefficients are found between BL and WH, BL and CH and WH and CH by [11] which are 0.735, 0.717, 0.907 respectively. [27], appear in Brazilian sport horses the correlation coefficient between CH and B L is highly significant (0.718) and (0.543) (P≤0.05) between WH and BL obtained. Genetic correlation aims to express the relationship between sets of genes and genes block influence the two traits in the same individual. Tables 6, 7 and 8 show the breeding values of sire for body measurements. The highest breeding value is 1.325 and the lowest value is -2.032 for WH, 1.316 and -2.656, 1.316 and -2.075 for MBH, 2.714 and -4.317 for HH, 2.908 and -4.606 for BH, 2.553 and -2.680 for DH, 2.932 and -4.394 for BL, 0.213 and -0.410 for CL, 0.00 and 0.00 for SJA, 1.811 and -0.306 for EJA and 0.661 and -0.780 for CA respectively. In selection programs preferred choose the sire which is excelled in more traits. Also the sire with number 3 and 4 are the best in six breeding values of measurements then sire with number 4. The highest breeding value is 2.932 for the BL and the lowest is 0.00 for the SJA angle, these differences may be due to the variation among individuals for these traits. [28] have stated that the breeding value of WH ranged from -1.31 to 1.46, this result is agreement with current result of this study.

| Parameters | Mean ± SE | Level of sig. |
|------------|-----------|---------------|
| WH         | 134.45 ± 1.89 | *             |
| AWH        | 132.82 ± 1.88 | *             |
| CH         | 136.47 ± 1.92 | NS            |
| MBH        | 132.61 ± 1.84 | *             |
| HH         | 130.63 ± 2.04 | NS            |
| BH         | 126.91 ± 2.06 | NS            |
| DH         | 130.61 ± 1.84 | NS            |

Continued table-1-

| Parameters | Mean ± SE | Level of sig. |
|------------|-----------|---------------|
| BL         | 140.34 ± 3.31 | *             |
| SL         | 48.11 ± 1.91 | NS            |
| Parameters | Mean ± SE | Level of sig. |
|------------|-----------|---------------|
| WH         | 123.75 ± 1.31 d | 128.80 ± 0.41 c | 133.38 ± 0.83 b | 142.88 ± 2.03 a |
| AWH        | 121.10 ± 2.34 d | 127.25 ± 0.35 c | 131.84 ± 0.88 b | 141.04 ± 2.03 a |
| CH         | 126.20 ± 0.92 d | 131.25 ± 0.47 c | 135.69 ± 0.83 b | 144.46 ± 2.17 a |

Continued table -2-

| Parameters | Mean ± SE | Level of sig. |
|------------|-----------|---------------|
| MBH        | 120.75 ± 2.35 d | 127.05 ± 0.30 c | 131.65 ± 0.89 b | 140.69 ± 1.97 a |
| HH         | 119.30 ± 1.97 d | 125.20 ± 0.77 c | 130.31 ± 1.07 b | 139.11 ± 2.11 a |
| BH         | 115.20 ± 2.14 d | 121.55 ± 0.76 c | 126.57 ± 1.22 b | 135.54 ± 2.20 a |
| DH         | 121.10 ± 1.08 c | 124.80 ± 0.85 c | 130.38 ± 0.57 b | 138.11 ± 2.01 a |
| BL         | 117.90 ± 3.91 d | 131.95 ± 0.91 c | 140.04 ± 0.57 b | 156.11 ± 2.33 a |
| SL         | 44.85 ± 1.54 b  | 42.50 ± 1.45 b  | 46.04 ± 1.03 b  | 52.69 ± 3.09 a  |
| AL         | 32.30 ± 1.42 c  | 36.60 ± 0.19 b  | 36.76 ± 0.60 b  | 43.50 ± 1.15 a  |
| CL         | 34.35 ± 0.46 c  | 36.45 ± 0.23 b  | 37.07 ± 0.15 b  | 38.77 ± 0.81 a  |
| SJA        | 40.10 ± 1.85 b  | 38.60 ± 0.89 b  | 38.84 ± 0.22 b  | 47.38 ± 1.38 a  |
| SJA        | 29.00 ± 1.09 b  | 29.10 ± 0.97 b  | 28.00 ± 1.06 b  | 34.54 ± 1.08 a  |
| SIJA       | 37.60 ± 1.04 d  | 39.70 ± 0.42 c  | 41.77 ± 0.32 b  | 47.69 ± 0.77a  |

** (P<0.01).

Means having with the different letters in same column differed significantly.
Table 3. Effect of sire on studied parameters.

| Parameters | Mean ± SE                | Level of sig. |
|------------|-------------------------|---------------|
|            | Sire 1                  | Sire 2        | Sire 3        | Sire 4        | Sire 5        |
| WH         | 128.19 ± 2.06 b         | 133.16 ± 2.86 a | 132.90 ± 2.89 a | 136.00 ± 2.88 a | 136.43 ± 2.66 a | *             |
| AWH        | 125.65 ± 2.59 b         | 131.72 ± 2.87 a | 131.40 ± 3.07 a | 134.22 ± 2.80 a | 134.81 ± 2.69 a | *             |
| CH         | 130.04 ± 1.77 b         | 135.11 ± 2.70 a | 135.00 ± 2.95 a | 138.68 ± 2.78 a | 138.68 ± 2.67 a | *             |
| MBH        | 125.57 ± 2.65 b         | 131.44 ± 2.83 a | 131.20 ± 3.07 a | 133.54 ± 2.72 a | 134.75 ± 2.75 a | *             |
| HH         | 122.88 ± 2.30 c         | 130.22 ± 2.91 b | 129.80 ± 2.75 b | 130.91 ± 2.67 b | 136.12 ± 2.64 a | **            |
| BH         | 118.76 ± 2.42 c         | 126.16 ± 3.04 b | 126.80 ± 3.19 b | 127.73 ± 2.73 ab | 132.06 ± 2.63 a | **            |
| DH         | 124.73 ± 1.71 c         | 131.11 ± 2.74 ab | 131.00 ± 2.96 ab | 129.13 ± 2.75 b | 134.06 ± 2.60 a | **            |
| BL         | 128.34 ± 4.94 c         | 139.61 ± 5.40 ab | 134.60 ± 4.21 bc | 145.82 ± 4.09 a | 143.31 ± 3.73 a | **            |
| SL         | 44.50 ± 1.32            | 48.72 ± 2.85   | 47.30 ± 2.34   | 49.23 ± 3.12   | 45.25 ± 3.05   | NS            |
| AL         | 34.80 ± 1.64 c          | 38.61 ± 1.81 ab | 36.00 ± 0.93 bc | 39.41 ± 1.42 a | 39.87 ± 1.36 a | *             |
| CL         | 35.46 ± 0.47 b          | 37.00 ± 0.87 bc | 36.20 ± 0.40 ab | 37.72 ± 0.92 a | 38.00 ± 0.45 a | *             |
| SJA        | 40.84 ± 1.33            | 41.44 ± 2.07   | 40.60 ± 1.91   | 43.18 ± 1.97   | 43.90 ± 1.48 a | NS            |
| CL         | 29.76 ± 1.11 ab         | 31.00 ± 0.92 ab | 27.80 ± 0.86 b  | 33.18 ± 1.82 a  | 28.00 ± 1.21 b | *             |
| SJA        | 40.07 ± 1.25 c          | 42.89 ± 1.53 ab | 41.20 ± 1.11 bc | 43.91 ± 1.48 a | 42.50 ± 1.40 ab | *             |

* (P<0.05), ** (P<0.01), NS: Non-Significant.

Means having with the different letters in same column differed significantly

Table 4. Heritability and overall means of parameters studied.

| Parameters | Heritability estimate | Overall means ± SE |
|------------|----------------------|--------------------|
| WH         | 0.52                 | 132.97 ± 1.24      |
| AWH        | 0.45                 | 131.11 ± 1.34      |
| CH         | 0.74                 | 135.14 ± 1.21      |
| MBH        | 0.42                 | 130.83 ± 1.33      |
| HH         | 0.31                 | 129.29 ± 1.34      |
| BH         | 0.31                 | 125.54 ± 1.38      |
| DH         | 0.25                 | 129.34 ± 1.18      |
| BL         | 0.80                 | 138.01 ± 2.31      |
| Parameters | WH   | AWH  | CH   | MBH  | HH   | BH   | DH   | BL   | SL   | AL   | CL   | SJA  | EJA  | CA   |
|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| WH         | -    | 0.91 | 0.96 | 0.88 | 0.94 | 0.78 | 0.86 | 0.86 | 0.57 | 0.76 | 0.84 | 0.63 | 0.42 | 0.82 |
| AWH        | 0.98 | -    | 0.85 | 0.88 | 0.79 | 0.91 | 0.81 | 0.79 | 0.47 | 0.76 | 0.81 | 0.68 | 0.41 | 0.82 |
| CH         | 0.99 | 0.96 | -    | 0.83 | 0.92 | 0.85 | 0.91 | 0.76 | 0.54 | 0.81 | 0.72 | 0.49 | 0.59 | 0.76 |
| MBH        | 0.98 | 0.99 | 0.96 | -    | 0.97 | 0.84 | 0.92 | 0.52 | 0.81 | 0.71 | 0.54 | 0.59 | 0.41 | 0.79 |
| HH         | 0.97 | 0.97 | 0.96 | 0.97 | -    | 0.92 | 0.84 | 0.81 | 0.52 | 0.74 | 0.85 | 0.54 | 0.40 | 0.74 |
| BH         | 0.97 | 0.98 | 0.96 | 0.97 | 0.99 | -    | 0.95 | 0.81 | 0.58 | 0.77 | 0.84 | 0.49 | 0.41 | 0.83 |
| DH         | 0.95 | 0.93 | 0.95 | 0.93 | 0.96 | 0.95 | -    | 0.77 | 0.52 | 0.83 | 0.73 | 0.58 | 0.62 | 0.79 |
| BL         | 0.94 | 0.95 | 0.91 | 0.94 | 0.92 | 0.86 | -    | 0.48 | 0.84 | 0.72 | 0.51 | 0.45 | 0.91 |      |
| SL         | 0.69 | 0.67 | 0.70 | 0.66 | 0.63 | 0.63 | 0.67 | 0.59 | -    | 0.46 | 0.62 | 0.51 | 0.73 | 0.52 |
| AL         | 0.85 | 0.84 | 0.84 | 0.83 | 0.86 | 0.84 | 0.81 | 0.86 | 0.51 | -    | 0.69 | 0.54 | 0.29 | 0.64 |
| CL         | 0.84 | 0.84 | 0.84 | 0.83 | 0.83 | 0.84 | 0.82 | 0.81 | 0.67 | 0.72 | -    | 0.51 | 0.54 | 0.75 |
| SJA        | 0.70 | 0.65 | 0.69 | 0.66 | 0.60 | 0.61 | 0.65 | 0.58 | 0.66 | 0.50 | 0.62 | -    | 0.57 | 0.76 |
| EJA        | 0.55 | 0.54 | 0.53 | 0.54 | 0.44 | 0.45 | 0.43 | 0.53 | 0.71 | 0.41 | 0.48 | 0.68 | -    | 0.52 |
| CA         | 0.91 | 0.91 | 0.89 | 0.91 | 0.86 | 0.86 | 0.84 | 0.91 | 0.68 | 0.76 | 0.82 | 0.75 | 0.69 |      |

Above: $r_G$ – Genetic correlation

| Parameters | WH   | AWH  | CH   | MBH  | HH   | BH   | DH   | BL   | SL   | AL   | CL   | SJA  | EJA  | CA   |        |
|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|        |
| SL         | 0.0016 | 46.89 ± 1.15 |
| AL         | 0.25   | 37.66 ± 0.76 |
| CL         | 0.23   | 36.82 ± 0.34 |
| SJA        | 0.005  | 41.48 ± 0.80 |
| EJA        | 0.71   | 30.30 ± 0.65 |
| CA         | 0.53   | 42.08 ± 0.65 |

Table 5. Genetic and Phenotypic correlations among parameters
Below: \( r_P \) – Phenotypic correlation

\* (P<0.05), ** (P<0.01).

Table 6. Breeding values of sire for WH, AWH, CH, MBH and HH measures.

| Sire | BV : WH | Sire | BV : AWH | Sire | BV : CH | Sire | BV : MBH | Sire | BV : HH |
|------|---------|------|----------|------|---------|------|----------|------|---------|
| 3    | 1.325   | 3    | 1.431    | 3    | 1.468   | 3    | 1.316    | 5    | 2.714   |
| 4    | 0.713   | 4    | 0.702    | 4    | 1.223   | 4    | 0.432    | 3    | 2.321   |
| 5    | 0.279   | 5    | 0.278    | 5    | 0.457   | 5    | 0.348    | 2    | -0.124  |
| 2    | -0.285  | 2    | -0.041   | 2    | -0.494  | 2    | -0.022   | 4    | -0.593  |
| 1    | -2.032  | 1    | -2.370   | 1    | -2.656  | 1    | -2.075   | 1    | -4.317  |

Table 7. Breeding values of sire for BH, DH, BL, SL and AL measures.

| Sire | BV : BH | Sire | BV : DH | Sire | BV : BL | Sire | BV : SL | Sire | BV : AL |
|------|---------|------|---------|------|---------|------|---------|------|---------|
| 3    | 2.908   | 3    | 2.553   | 4    | 2.932   | 4    | 0.007   | 4    | 0.254   |
| 5    | 2.340   | 5    | 1.260   | 3    | 1.616   | 2    | 0.004   | 3    | 0.232   |
| 4    | -0.220  | 2    | 0.635   | 2    | 0.371   | 3    | 0.002   | 5    | 0.214   |
| 2    | -0.420  | 4    | -1.768  | 5    | -0.525  | 5    | -0.006  | 2    | 0.203   |
| 1    | -4.606  | 1    | -2.680  | 1    | -4.394  | 1    | -0.007  | 1    | -0.904  |

Table 8. Breeding values of sire for CL, SJA, EJA and CA measures.

| Sire | BV : CL | Sire | BV : SJA | Sire | BV : EJA | Sire | BV : CA |
|------|---------|------|----------|------|----------|------|---------|
| 4    | 0.213   | 1    | 0.00     | 4    | 1.811    | 4    | 0.661   |
| 5    | 0.149   | 2    | 0.00     | 2    | 0.328    | 3    | 0.375   |
| 2    | 0.034   | 3    | 0.00     | 5    | -1.644   | 2    | 0.302   |
| 3    | 0.012   | 4    | 0.00     | 1    | -0.187   | 5    | -0.553  |
| 1    | -0.410  | 5    | 0.00     | 3    | 0.306    | 1    | -0.786  |

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