

Genetic parameters of linear profiling scores in BWP foals



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The BWP linear scoring scheme for foals

- Operated since 2016 (now 4 years of data)
- Foals under 1 year of age, scored at mare contests

=> assess conformation and movements at early age



BWP Linear profiling scheme for foals

Conformation

Body Shape
Development
Body Direction
Breed type& expression

Legs

Neck Length
Neck position
Withers development
Back loins (line)
Croup slope

Length
Position forelegs
Position hindlegs
Pasterns
Development

Gaits

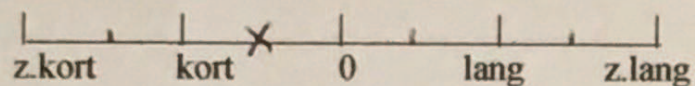
Length of stride
Suppleness
Impulsion
Correctness
Movement technique

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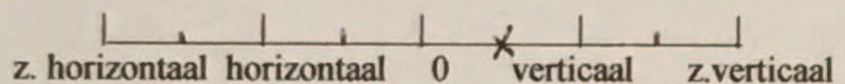
Scoring on paper

9 point scale,
use of “words” to describe the extremes for each trait

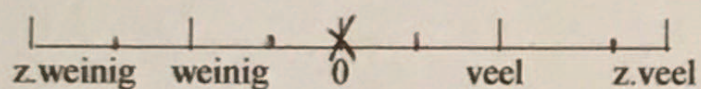
HALS: Lengte :



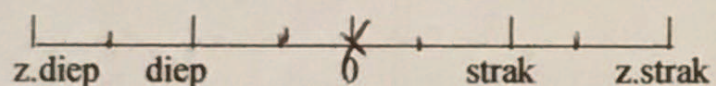
Richting :



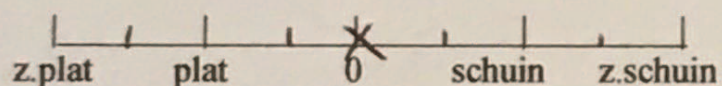
SCHOFT : Ontwikkeling :



MIDDENSTUK : Verloop :



KRUIS : Helling :



Data entry, scores translated into [-20,20]

Naam TOULOUSE-P
Levensnummer 056-002-W00323571
Datum 31/08/19
Jury 741636 STEFAAN DE SMET - STENENBRUG - 9160 EKSAARDE
Plaats Sint Nikolaas
Optie Springen

Type		Beenwerk		Bewegingen	
Model	5	Lengte	5	Ruimte	0
Ontwikkeling	5	Stand voorbenen (Vla/Fr)	0	Lichtvoetigheid/souplesse	0
Romprichting	0	Stand achterbenen	0	Afdruk	0
Ras_Uitstraling	10	Kootstand	0	Bewegingstechniek	0
HalsLengte	0	Ontwikkeling	0	Zuiverheid / tact	0
HalsRichting	0			Standbenen massa	99
				Ongelijkheid hoof	99

Opmerkingen

Missing value

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First analysis of the data during the

masterthesis of Marie – Astrid Vandamme,



GENETIC ANALYSIS OF LINEAR CLASSIFICATION OF BELGIAN WARBLOOD FOALS AND MARES

MARIE-ASTRID VAN DAMME

TRAVAIL DE FIN D'ÉTUDES PRÉSENTÉ EN VUE DE L'OBTENTION DU DIPLÔME DE
MASTER BIOINGÉNIEUR EN SCIENCES AGRONOMIQUES

ANNÉE ACADÉMIQUE 2018-2019

Data on 1612 foals used

12 assessors,
8 – 9 assessors/year

Table 2: Number of foals by year and by judge

Jury	Year			Total
	2016	2017	2018	
Dupon	61	88	167	316
Van Den Broeck	83	92	94	269
Van De Vijver	22	65	124	211
De Smet	40	68	62	170
Geldof	44	109	8	161
Schepers	30	43	45	118
Bode	4	9	63	76
Arnauts	76	0	0	76
Unknown	0	0	59	59
Sammels	58	0	0	58
Nevejant	43	35	0	35
Claes	0	35	0	35



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12 locations + remainder / age in classes

Table 3: Number of foals by place and by date

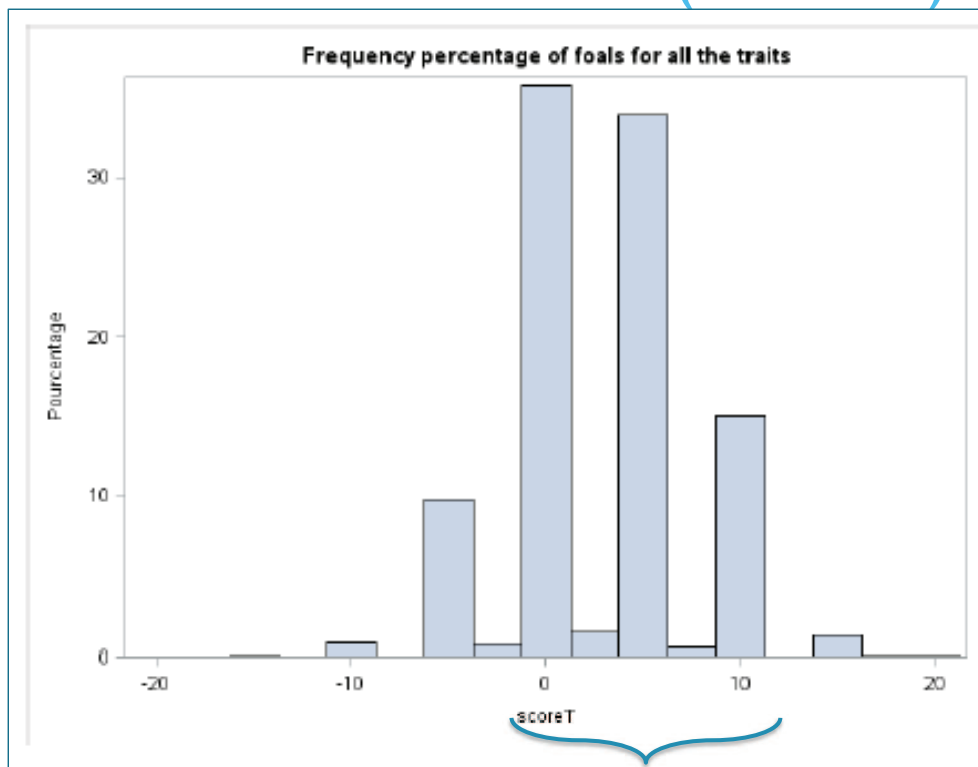
Place	Year		
	2016	2017	2018
Bocholt	76	37	68
Evergem	40	39	50
Glabbeek	30		
Moerbeke-Waas	44	45	53
Moorsele	41	44	77
Pittem		30	40
Pulderbos	116	157	163
Sint-Lievens	22		
Sint-Niklaas	43	65	62
Tienen		29	36
Vlierzel			45
Wambeek		35	
« Place »	52	32	40
TOTAL	464	515	634

Table 1: Number of foals by the age class

Age class	No.
Age ≤ 1 month	121
1 month < age ≤ 2 months	435
2 months < age ≤ 3 months	513
3 months < age ≤ 4 months	380
4 months < age ≤ 6 months	163

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Distribution of scores (all traits)



Most scores 0, 5 and 10

Descriptive statistics

Trait	Mean	SD	Min	Max
1. Body shape	2.75	4.64	-15	15
2. Development	1.52	4.18	-15	17.50
3. Body Direction	0.39	3.50	-10	10
4. Breed type and expression	2.97	4.56	-15	15
5. Neck length	1.02	3.71	-10	10
6. Neck position	2.45	3.30	-10	12.50
7. Withers development	0.61	2.77	-10	10
8. Back+ loins: line	-0.41	2.34	-10	10
9. Croup slope	0.59	2.25	-10	10
10. Limbs length	1.43	3.49	-10	15
11. Position forelegs	0.36	1.53	-10	10
12. Position hind legs	0.00	2.00	-10	10
13. Position pasterns	0.03	2.03	-12.50	10
14. Limb development	-0.68	3.32	-10	10
15. Gaits: Length of stride	2.97	4.99	-12.50	20
16. Gaits: Suppleness	3.49	4.83	-15	20
17. Gaits: Impulsion	2.13	5.23	-15	20
18. Gaits: Correctness	3.17	4.41	-15	20
19. Gaits: Movement technique	2.93	4.78	-15	20

Expected SD of 5 to 6

Heritability coefficients (avg. =0,20)

Trait	Heritability
1. Body Shape	0.29
2. Development	0.11
3. Body Direction	0.14
4. Breed type and expression	0.31
5. Neck length	0.22
6. Neck position	0.22
7. Withers development	0.08
8. Back+ loins: line	0.15
9. Croup slope	0.12
10. Limbs length	0.23
11. Position forelegs	0.17
12. Position hind legs	0.10
13. Position pasterns	0.12
14. Limb development	0.21
15. Gaits: Length of stride	0.34
16. Gaits: Suppleness	0.27
17. Gaits: Impulsion	0.25
18. Gaits: Correctness	0.25
19. Gaits: Movement technique	0.28

Low heritabilities

Moderately high

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Heritabilities (diagonal), genetic correlations (above diagonal)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Body Shape	0.29	0.63	0.20	0.35	0.53	0.20	0.27	-0.17	0.06	0.64	0.17	-0.02	0.39	-0.26	0.59	0.38	0.42	0.50	0.42
2. Development	0.43	0.11	0.37	0.41	0.31	0.55	0.39	-0.08	0.30	0.62	-0.12	-0.10	0.65	0.03	0.56	0.37	0.48	0.55	0.54
3. Body Direction	0.22	0.25	0.14	0.79	0.47	0.43	0.30	0.69	0.20	0.33	-0.09	-0.29	0.04	-0.26	0.63	0.79	0.78	0.70	0.76
4. Breed type and expression	0.25	0.23	0.34	0.31	0.73	0.67	0.19	0.48	0.13	0.41	-0.04	-0.23	0.26	-0.41	0.53	0.84	0.76	0.75	0.79
5. Neck length	0.36	0.31	0.23	0.35	0.22	0.55	0.27	0.16	0.07	0.60	0.22	-0.09	0.36	-0.51	0.61	0.77	0.69	0.75	0.69
6. Neck position	0.11	0.17	0.22	0.29	0.26	0.22	0.07	-0.08	0.30	0.52	-0.08	-0.25	0.36	-0.18	0.52	0.66	0.67	0.75	0.75
7. Withers development	0.14	0.19	0.20	0.11	0.20	0.11	0.08	0.20	0.61	0.54	0.01	-0.01	0.51	-0.14	0.33	0.20	0.24	0.31	0.24
8. Back+ loins: line	0.09	0.11	0.21	0.16	0.08	0.06	0.11	0.15	0.14	0.05	0.07	-0.15	-0.21	-0.46	0.11	0.35	0.22	0.15	0.30
9. Croup slope	0.00	0.04	0.01	0.03	0.03	0.03	0.15	0.07	0.12	0.51	-0.23	0.33	0.20	0.21	0.32	0.17	0.02	0.22	0.20
10. Limbs length	0.36	0.48	0.19	0.18	0.34	0.19	0.20	0.14	0.08	0.23	0.19	-0.03	0.50	-0.61	0.50	0.39	0.40	0.56	0.51
11. Position forelegs	0.00	-0.02	0.00	-0.01	0.00	-0.05	-0.06	0.03	-0.04	0.05	0.17	-0.32	0.10	-0.49	0.15	0.06	0.16	0.06	0.12
12. Position hind legs	-0.02	0.01	-0.05	-0.03	-0.03	-0.05	0.02	-0.02	-0.01	0.02	-0.01	0.10	0.32	-0.12	-0.39	-0.35	-0.51	-0.30	-0.37
13. Position pasterns	0.02	0.06	0.05	0.04	0.00	-0.01	0.04	0.02	0.05	0.07	-0.03	0.09	0.12	-0.12	0.13	0.08	0.19	0.25	0.19
14. Limbs development	0.01	0.23	0.01	-0.16	-0.01	-0.02	0.06	-0.04	-0.02	0.02	-0.04	0.00	0.05	0.21	-0.10	-0.27	-0.13	-0.24	-0.29
15. Gaits: Length of stride	0.31	0.27	0.24	0.29	0.27	0.23	0.15	0.05	0.02	0.27	0.01	-0.10	-0.04	0.01	0.34	0.86	0.87	0.92	0.89
16. Gaits: Suppleness	0.24	0.14	0.22	0.44	0.21	0.25	0.11	0.07	0.04	0.19	0.00	-0.09	-0.01	-0.15	0.68	0.27	0.93	0.95	0.96
17. Gaits: Impulsion	0.23	0.21	0.22	0.37	0.23	0.22	0.14	0.06	0.03	0.19	0.00	-0.09	0.02	-0.01	0.68	0.73	0.25	0.92	0.92
18. Gaits: Correctness	0.23	0.17	0.18	0.35	0.23	0.21	0.12	0.05	0.02	0.21	-0.01	-0.08	0.02	-0.05	0.64	0.70	0.72	0.25	0.97
19. Gaits: Movement technique	0.24	0.18	0.22	0.37	0.24	0.21	0.14	0.05	0.05	0.21	0.00	-0.04	0.01	-0.03	0.68	0.72	0.75	0.79	0.28

Correlations

(|0.4| to |0.6| relatively strong; > |0.6| to |0.8| strong ; > |0.8| very strong)

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Next steps

- Repeat analysis with data of 2019 included
- Estimate ebv's and prepare publications of relative EBV's
- Estimate genetic correlations with scores obtained in mares

*at the moment, Calo correlations have been computed
(correlations between the ebv's, taking into account reliabilities)*

Conclusions

- Linear scores in foals have low to moderately high heritability coefficients
(average=0,20 compared to 0,27 in mares)

- 1) Procedure in foals is less precise than in mares
(time-constraint !! It goes too fast....)
- 2) Development and growth of the foals is not properly corrected for?
- 3) Use of the range of scores is less than theoretically expected

But growing interest from breeders, so a lot of data and at early age which is beneficial for the evaluation of stallions.

