

# 42nd Annual Meeting of the European Association for Animal Production

Berlin, Germany  
September 9 - 12, 1991

## First steps to a linear description of conformation in the Swiss Horse Breeding H1.6

Commission for Horse Production  
Session I: Quantitative Genetics in Horse Breeding

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### Introduction

At present the Swiss Horse Breeding is in a time of development of the breed. Modern statistical methods will be more used in horse breeding. In that sense a reform of the conformation-judging is necessary.

The Swiss Horse Breeding promoted by the state comprehends three different races. Nowadays about 4900 Freiburger, 3000 Warmblood and 800 Haflinger mares are covered. Selection on conformation plays an important role in the breeding program now. At the federal events from August until October about 19'000 horses (foals and adults) are judged by a commission.

The conformation is judged by using a pointsystem with three degrees (satisfactory, good, very good). This data is difficult to use in a modern breeding system because of the low variance, high subjectivity and very low possibility of interpretation.

These points are improved by a linear description, which is already used in some dairy breeds. The linear description is not a kind of evaluation but a description of biologically possible forms. In summer 1990 a test was started to get some experience and to inform the breeders and judges about a new system.

### Execution

Based on tests with linear description in the Netherlands and Germany registration forms were developed, which should facilitate the work of the judges. The aim is to create an uniform system for the three races of the Swiss Horse Breeding. In figure 1 the registration form for the 6-month-old foals is shown. This form is used during the season 1991. Also a linear description of the 2,5 years-old horses takes place.

In the first step in 1990 30 traits were scored at the adults while only 11 traits were used at the foals. The traits were described with a scale of notes from 1 to 9, which average should be by 5.

At some federal events the same person was working as a judge. Table 1 shows a summary about the structure of the data. A statistical analysis was made with a PC-version of the SAS-program.

Table 1: Structure of the data

|                       | Freiberger | Schweizer Warmblut |
|-----------------------|------------|--------------------|
| <b>Fohlen</b>         |            |                    |
| n                     | 380        | 510                |
| Schauplätze           | 14         | 26                 |
| Väter                 | 41         | 99                 |
| mehr als 5 Nachkommen | 13         | 29                 |
| <b>2,5-jährige</b>    |            |                    |
| n                     | 190        | 140                |
| Schauplätze           | 15         | 12                 |
| Väter                 | 59         | 53                 |
| mehr als 5 Nachkommen | 11         | 9                  |

Tab. 2: Means and standardeviations of the traits of the lineaer description of foals

| Merkmal                   | $\bar{x}$ | s   | min | max |
|---------------------------|-----------|-----|-----|-----|
| <b>Freiberger</b>         |           |     |     |     |
| 1. Ausdruck               | 6.1       | 1.3 | 2   | 9   |
| 2. Schulterlänge          | 5.7       | 1.0 | 2   | 9   |
| 3. Kruppenlänge           | 5.6       | 1.1 | 3   | 9   |
| 4. Kruppenneigung         | 5.7       | 0.8 | 3   | 9   |
| 5. Rückenlinie            | 4.4       | 0.9 | 1   | 7   |
| 6. Stellung vorne         | 5.4       | 0.9 | 3   | 8   |
| 7. Vorderbeinstell.       | 4.5       | 0.9 | 1   | 7   |
| 8. Hinterbeinstell.       | 5.2       | 0.9 | 2   | 8   |
| 9. Gänge: Korrekth.       | 5.7       | 1.0 | 2   | 9   |
| 10. Gänge: Schwung        | 5.8       | 1.4 | 2   | 9   |
| 11. Typ                   | 5.8       | 1.4 | 1   | 9   |
| <b>Schweizer Warmblut</b> |           |     |     |     |
| 1. Ausdruck               | 6.0       | 1.1 | 2   | 9   |
| 2. Schulterlänge          | 6.2       | 1.1 | 3   | 9   |
| 3. Kruppenlänge           | 5.6       | 1.2 | 2   | 9   |
| 4. Kruppenneigung         | 5.0       | 0.9 | 2   | 7   |
| 5. Rückenlinie            | 4.7       | 0.9 | 1   | 8   |
| 6. Stellung vorne         | 5.7       | 1.0 | 2   | 9   |
| 7. Vorderbeinstell.       | 5.1       | 0.8 | 3   | 7   |
| 8. Hinterbeinstell.       | 5.3       | 1.0 | 1   | 8   |
| 9. Gänge: Korrekth.       | 5.6       | 1.0 | 2   | 9   |
| 10. Gänge: Schwung        | 6.0       | 1.4 | 1   | 9   |
| 11. Typ                   | 5.7       | 1.3 | 1   | 8   |

## Results

From the practical view the linear description can also be carried out in horse breeding. The time used for the description can be held in an acceptable frame, if only essential, valuable traits are taken into consideration. It takes 2 minutes for each foal and about 6 minutes for 2,5 years old, if there is a good organisation of the event and if the judge has some experience. The use of the present form reduces the writing work of the judges and improves the readability for the registration in computers.

Table 2 gives a survey about the distribution of the notes for the description of the foals. Obviously the scale of notes was used quite in the way of the normal distribution. The same distribution could also be found at the 2,5 years old.

The correlations between the traits showed a small relationship, indicating that independent traits had been used. Only the correlation between the front-position and the correctness of the gaits showed a narrow relationship with  $r=0.60$  and  $r=0.74$  for the Freiberger and Warmblood respectively. Negative correlations between the shape of the croup to the correctness of the gaits and the type as well as the expression were found (traits Nr. 4 - 9 see table 2).

A more detailed genetic-statistical analysis could not be established because of the quantity of the data. A first presentation of the description of two stallions' progeny is shown in figure 2.

## Conclusion

From the practical view the linear description is also possible in the horse breeding. The time and organisation are raised in an acceptable way. Positive is that the breeders can be given more informations about the stallions. the correlations between the traits were expected and showed previous experiences. In future the judges will have to be trained and they will have to use the whole scale of notes.

Considering the results of Dutch and German investigations a heritability of about 20% will be expected. In future a breeding value estimation shall allow to get the genetic conformation quality of the breeding horses. This will be a step forward to make the breeding work more objective.

## Literatur

- Veldhuizen, van A.E. (1991): Hoe erfelijk is het exterieur bij rijpaarden. In de Strengen 58, Nr. 13, 24-25
- Weymann, W. (1989): Untersuchungen zur linearen Exterieurbewertung in der Reitpferdezucht. Dipl.-Arbeit Göttingen

Figure 1: Registration form of linear description of foals

**LINEARE BESCHREIBUNG FÜR SCHWEIZER FOHLEN (0,5 jährig)**  
**DESCRIPTION LINÉAIRE POUR POULAINS SUISSES (0,5 ANS)**

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Schau/concours: \_\_\_\_\_ Datum/date: \_\_\_\_\_ Richter/juge: \_\_\_\_\_  
 ID-Nr. :                       
 Vater/père: \_\_\_\_\_  
 Geburtsdatum/date de naissance: \_\_\_\_\_ O m. O f. Rasse/race: PM DS HF MT

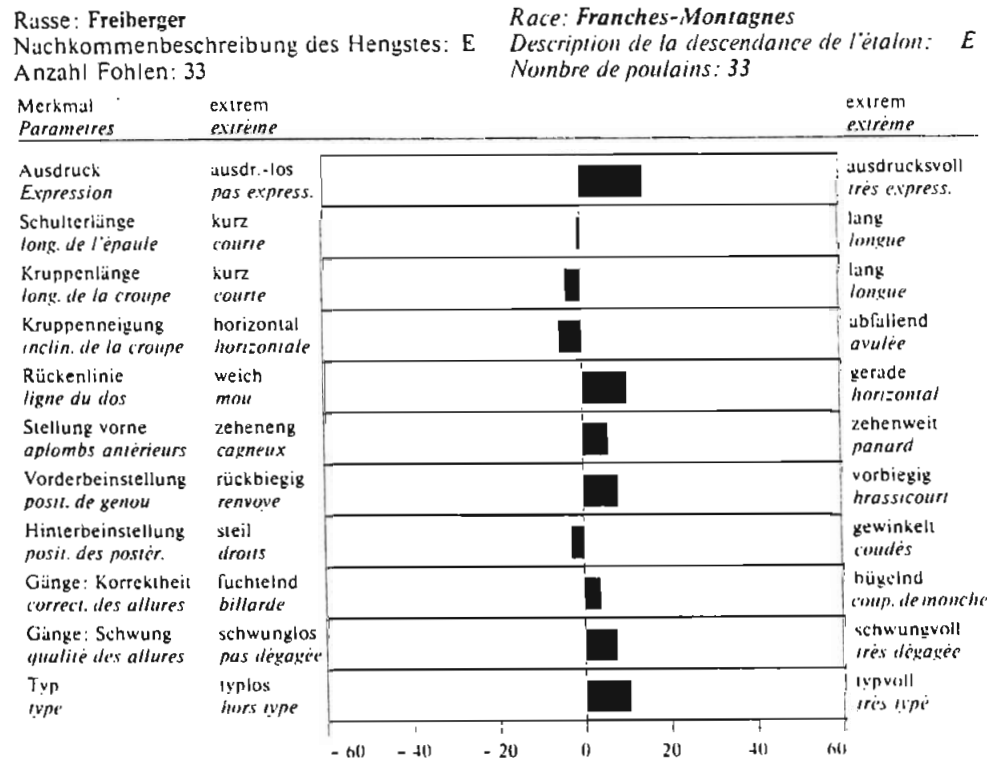
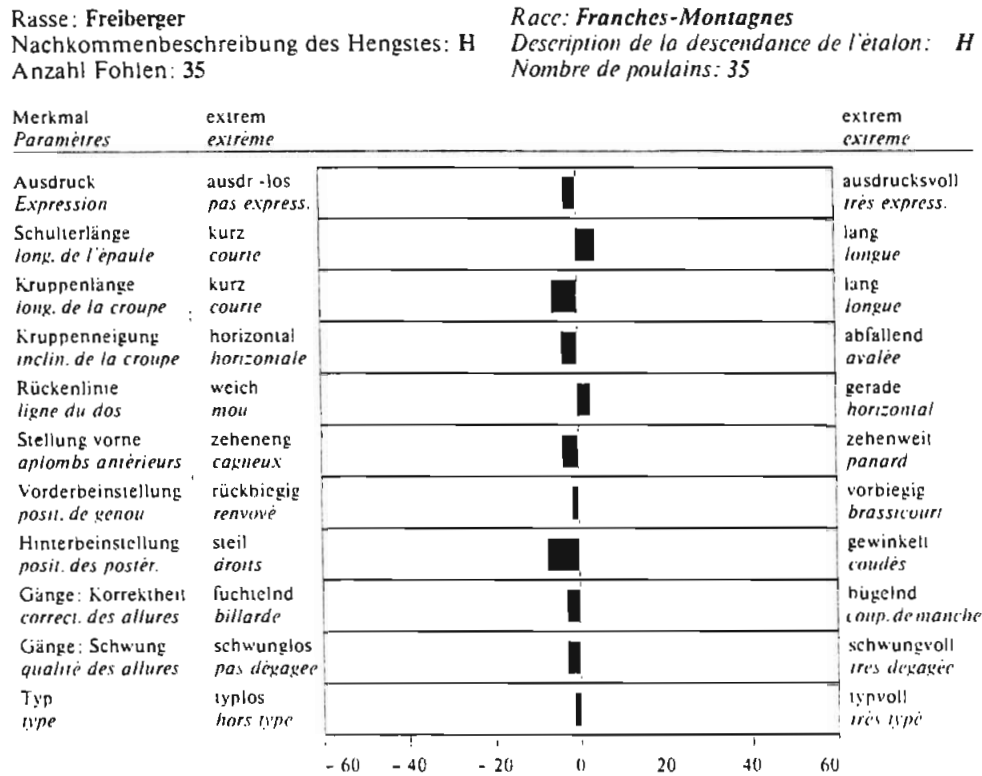
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Gesamtersch./impression générale: \_\_\_\_\_ Körperbau/conformation: \_\_\_\_\_ Gänge/allures: \_\_\_\_\_

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|                                               | extrem                        | 1                   | 2 | 3 | 4 | 5                      | 6 | 7 | 8 | 9 | extrem                          | Hänge/défauts                       |
|-----------------------------------------------|-------------------------------|---------------------|---|---|---|------------------------|---|---|---|---|---------------------------------|-------------------------------------|
| 1. Ausdruck<br>expression                     | ausdruckslos<br>pas expressif | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | ausdrucksvoll<br>très expressif | 0                                   |
| 2. Halslänge<br>long. de l'encol.             | kurz<br>courte                | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | lang<br>longue                  | 0                                   |
| 3. Schulterlänge<br>long. de l'épaule         | kurz<br>courte                | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | lang<br>longue                  |                                     |
| 4. Schulterneigung<br>inclin. de l'épaule     | steil<br>droite               | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | schräg<br>inclinée              |                                     |
| 5. Rückenlinie<br>ligne du dos                | weich<br>mou                  | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | gerade<br>horizontal            | 0                                   |
| 6. Kruppenlänge<br>long. de la croupe         | kurz<br>courte                | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | lang<br>longue                  | 0                                   |
| 7. Kruppenneigung<br>inclin. de la croupe     | horizontal<br>horizontale     | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | abfallend<br>avalée             |                                     |
| 8. Vorderbeinstellung<br>posit. du genou      | rückbiegig<br>renvoyé         | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | vorbieigig<br>brassicourt       | 0 knieeng<br>genoux en x            |
| 9. Sprunggelenkwinkelung<br>angle des jarrets | steil<br>droits               | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | gewinkelt<br>coudés             | 0 kuhhessig<br>jarr. clos           |
|                                               |                               |                     |   |   |   |                        |   |   |   |   |                                 | 0 fassbeinig<br>jarr. cambrés       |
|                                               |                               |                     |   |   |   |                        |   |   |   |   |                                 | 0 eingeschnürt v.<br>étranglés ant. |
|                                               |                               |                     |   |   |   |                        |   |   |   |   |                                 | 0 hinten<br>étranglés post.         |
|                                               |                               |                     |   |   |   |                        |   |   |   |   |                                 | 0 Bockhuf<br>bot                    |
|                                               |                               |                     |   |   |   |                        |   |   |   |   |                                 | 0 ger. Trachten<br>talons fuyants   |
| 10. Gänge: Korrektheit<br>allures: correct.   | fuchtelnd<br>billarde         | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | bügelnd<br>coup. de manch.      | 0 lahm vo. li.<br>boiterie ant. q.  |
| 11. Gänge: Schwung<br>allures: ampleur/impul. | schwunglos<br>courtes         | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | schwungvoll<br>amples           | 0 lahm h.l.<br>post q.              |
|                                               |                               |                     |   |   |   |                        |   |   |   |   |                                 | 0 h.r.<br>post. d.                  |
| 12. Typ<br>type                               | typlos<br>hors type           | 0                   | 0 | 0 | 0 | 0                      | 0 | 0 | 0 | 0 | typvoll<br>très typé            | 0 Gebäude überbaut<br>surbâti       |
|                                               | extrem                        | 1                   | 2 | 3 | 4 | 5                      | 6 | 7 | 8 | 9 | extrem                          | 0 schmal<br>étroit                  |
| Allgemeinzustand/ condition générale          |                               | 0 zu fett/trop gras |   |   |   | 0 zu mager/trop maigre |   |   |   |   |                                 |                                     |
| Bemerkungen/remarques:                        |                               |                     |   |   |   |                        |   |   |   |   |                                 |                                     |

Figure 2: Linear description of the progeny (foals) of two Freigerber-stallions





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42. Jahrestagung der EVT

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42nd Annual Meeting of the EAAP

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42ième Réunion de la F. E. Z.

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8. - 12. September 1991 in Berlin

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**Title :** Erste Ansätze für eine lineare Beschreibung des Exterieurs in der Schweizerischen Pferdezucht

**Commission :** Pferdeproduktion

**Session :** I **Theme :** Quantitative Genetik in der Pferdezucht

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In der staatlichen geförderten Pferdezucht der Schweiz werden drei Rassen betreut. Bei steigender Tendenz werden derzeit ca. 4900 Freiberger-, 3000 Warmblut- und 800 Haflingerstuten belegt. Die Selektion anhand des Exterieurs stellt derzeit einen wesentlichen Bestandteil des Zuchtprogramms dar. Anlässlich der eidgenössischen Schauen von August bis Oktober werden vom Fohlen bis zum adulten Tier ca. 19'000 Pferde von einer Kommission beurteilt. Im Hinblick auf eine Verbesserung und Objektivierung der Exterieurbeurteilung sowie der Bereitstellung von Informationen für die Züchter wurden im Sommer 1990 erste Versuche mit der linearen Beschreibung durchgeführt.

Die Lineare Beschreibung stellt keine Bewertung von Exterieurkriterien dar, sondern eine Beschreibung der möglichen biologischen Ausprägungen. Anhand eines Formulars mit 11 bzw. 30 ausgewählten Kriterien für 6-monatige Fohlen bzw. für 2,5-jährige Jungpferde wurden Freiberger und Warmblutpferde anlässlich der Schauen von einem Richter beschrieben.

Zum einen wurde die Durchführbarkeit des Verfahrens auf normalen Schauen geprüft. Bei einiger Übung und guter Organisation des Schauablaufs ist mit einem Zeitaufwand von ca. 2 Minuten pro Fohlen und ca. 6 Minuten für die 2,5-jährigen zu rechnen. Eine Beschränkung auf die wesentlichsten Merkmale würde den Zeitaufwand verkürzen helfen.

Bei einer statistischen Auswertung ergeben sich Werte, die in einem üblichen Rahmen der Normalverteilung angenähert sind. Die phänotypischen Korrelationen deuten auf recht eigenständige Merkmale hin. Erste Beschreibungen von Nachkommengruppen der Hengste lassen Unterschiede erkennen. Im Rahmen einer umfassenden Datenerfassung und Durchführung von Zuchtwertschätzungen wird dem Züchter und der Zuchtleitung ein informatives Selektionshilfsmittel zur Verfügung stehen.



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The linear description is not a kind of evaluation but a description of biologically possible forms. Foals (6-month) and young horses (2,5 years) of the Freiburger and Warmblood were described by a judge with a formular containing 11 respectively 30 traits.

In a first step the practicability on normal events of a linear description was examined. It takes 2 minutes for each foal and about 6 minutes for 2,5 years old, if there is a good organisation of the event and if the judge has some experience. The use of the only necessary traits could help to shorten the time.

Statistical analysis showed, that the results were nearly normal distributed. The phenotypic correlations indicated that independent traits were used. First descriptions of the progeny of some stallions showed differences. With a extensive registration of data and a breeding value estimation the breeders and the breeding management will get an informative instrument of selection.