

# The linear profiling in **Swiss horse breeding** - more than 20 years of experience

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Zuchtverband CH-Sportpferde ZVCH  
(Swiss Warmblood)



11.-12.02.2016 Warendorf

[www.swisshorse.ch](http://www.swisshorse.ch)

## The linear profiling in Swiss horse breeding

1. Introduction
2. Historical review
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4. The procedure
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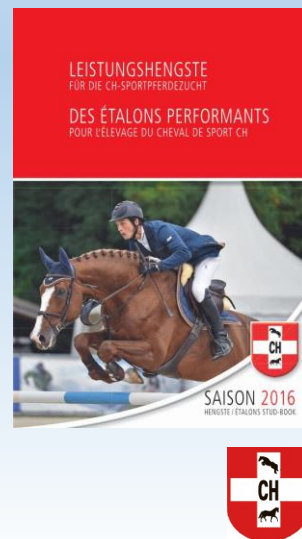
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## 1. Introduction

## Zuchtverband CH-Sportpferde (Swiss Warmblood)

- Association founded in 1996
- 1'900 members
- 500 foals per year
- 350 horses in the age of 3 years in the field performance test
- 80 stallions active
- ~40% of the foals are from single cover permits

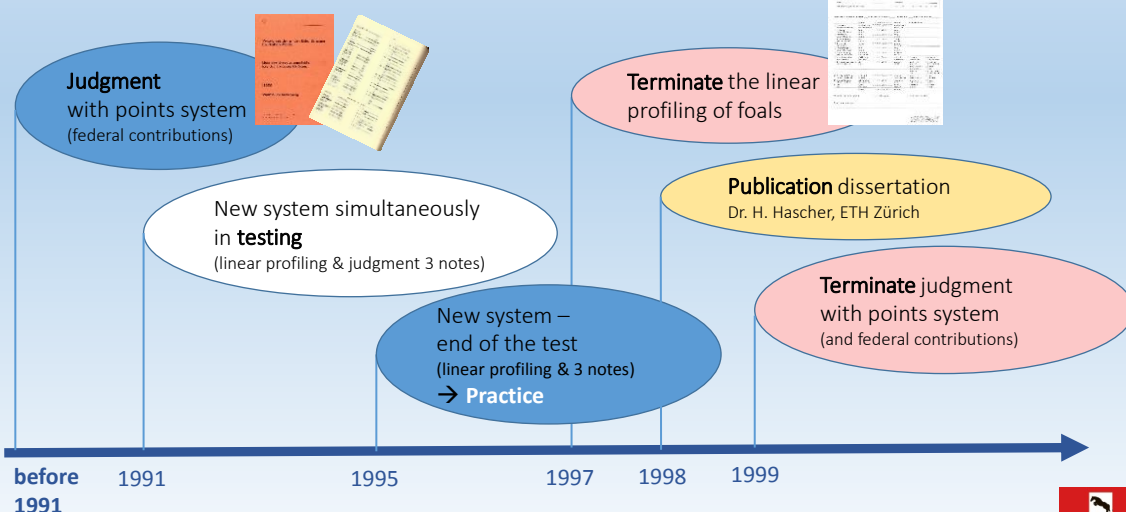


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## 2. Historical review

## From judgment to linear profiling



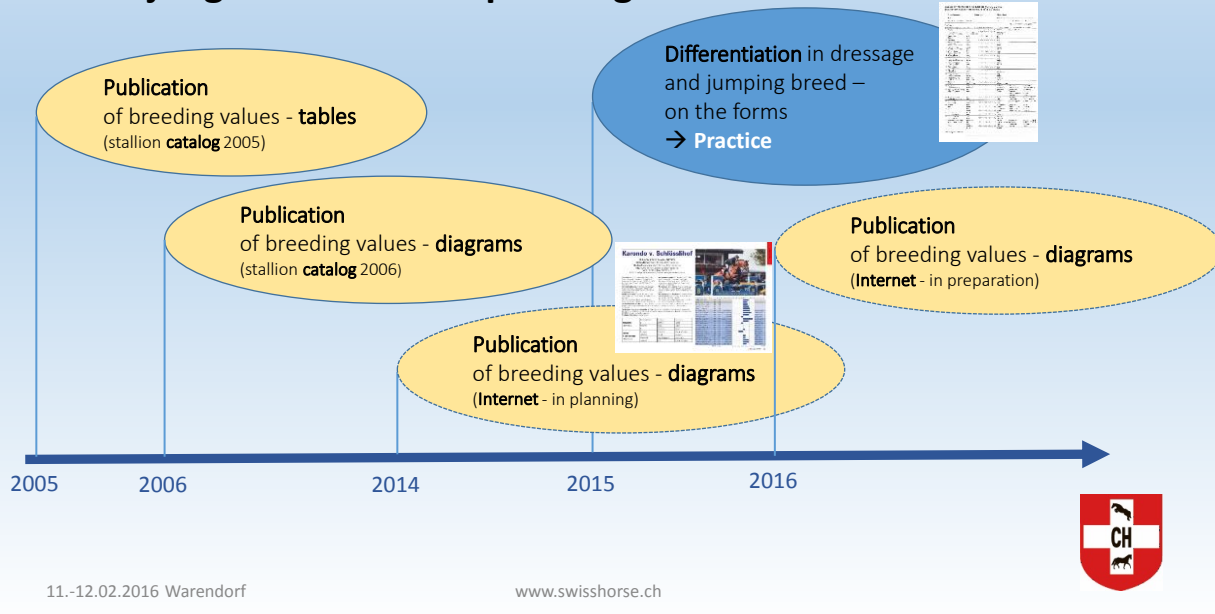
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2. Historical review

# From judgment to linear profiling



# Linear profiling of foals

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

Schau/vomcour: \_\_\_\_\_ Datum/date: \_\_\_\_\_ Richter/Juge: \_\_\_\_\_  
 ID-Nr: \_\_\_\_\_ Vater/père: \_\_\_\_\_  
 Geburtsdatum/date de naissance: \_\_\_\_\_ ♂ m. □ ♀ f. Rasse: FM DS HF MT

Gesamtersch./impression générale: \_\_\_\_\_ Körperbau/conformation: \_\_\_\_\_ Gänge/gaitures: \_\_\_\_\_ Punktierung/pontage: \_\_\_\_\_

1. Kopfdruck expression de la tête	extrem austrocknet sans expression	1 2 3 4 5 6 7 8 9	extrem ausdrucksvoll expressive	<input type="checkbox"/>
2. Halslänge long. de l'encolure	kurz courte	<input type="checkbox"/>	lang longue	<input type="checkbox"/>
3. Schulterlänge long. de l'épaule	kurz courte	<input type="checkbox"/>	lang longue	<input type="checkbox"/>
4. Schulterregung incl. de l'épaule	steil droite	<input type="checkbox"/>	schräg incluse	<input type="checkbox"/>
5. Rückenlinie ligne du dos	weich molle	<input type="checkbox"/>	gerade horizontale	<input type="checkbox"/>
6. Kruppenlänge long. de la croupe	kurz courte	<input type="checkbox"/>	lang longue	<input type="checkbox"/>
7. Kruppenneigung incl. de la croupe	horizontal horizontale	<input type="checkbox"/>	abfallend avalant	<input type="checkbox"/>
8. Vorderbeinstellung post. des ant.	rückwärts renversée	<input type="checkbox"/>	vorknecht brassé court	<input type="checkbox"/> knieweit ant. cambrié
9. Sprunggelenkwinkelung angl. des jarrets	starr drot	<input type="checkbox"/>	gewinkelt coude	<input type="checkbox"/> feinstehend jarr. cambrés <input type="checkbox"/> eingestrichelt u. strampt étranglé ant. <input type="checkbox"/> Blockhuf bot <input type="checkbox"/> unreg. Taktmaß talons fuyants
10. Korrektheit d. Gänge correct. des allures	fuchtelnd battée	<input type="checkbox"/>	bügelnd coude, stranche	<input type="checkbox"/> lahm vor h. boite avant h.
11. Gänge: Schwung amplit. amplitude	schwunglos sans amplitude	<input type="checkbox"/>	schwungvoll amplie	<input type="checkbox"/> vor re. ant. drot <input type="checkbox"/> lahm h. d. boite post. h.
12. Typ type	typlos sans type	<input type="checkbox"/>	typvoll type	<input type="checkbox"/> h. re. post. d. <input type="checkbox"/> überlaut surché <input type="checkbox"/> schmal étroit

extrem 1 2 3 4 5 6 7 8 9 extrem

Allgemeinzustand état général  zu fett/trop gras.  zu mager/trop maigre

Bemerkungen/remarques: \_\_\_\_\_

Schweizerischer Pferdezuchtverband, Fédération suisse d'élevage équin  
Helmli 100, CH-8100 Olten, Schweiz  
Tel. 031/311 43 42, Fax 031/311 32 65

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3. The data material

### Number of linear profilings of three-year-old horses

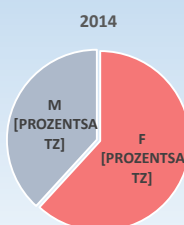
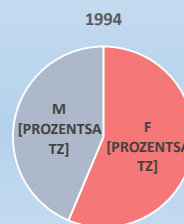
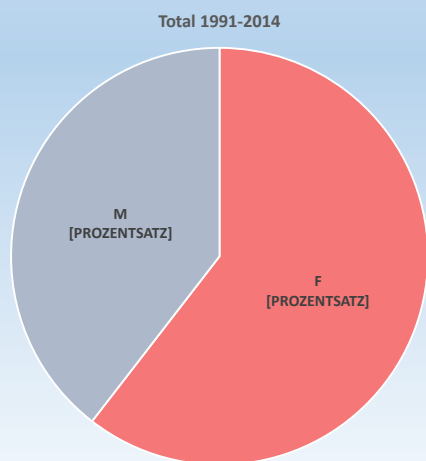


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3. The data material

### Proportion male / female



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3. The data material

## Heritabilities – abstract

(Total 24 traits profiling + 1 height + 3 traits judgment)

	Lineare Beschreibung Exterieur	Linear profiling traits	h <sup>2</sup>
1	Kopfausdruck	Head expression	0.30
3	Halslänge	Neck length	0.19
5	Halsmuskulatur	Neck muscularity	0.24
8	Schulterlänge	Length of shoulder	0.13
9	Schulterneigung	Incline of shoulder	0.13
10	Rückenlänge	Length of back	0.24
11	Rückenlinie	Line of back	0.21
12	Kruppenlänge	Length of croupe	0.20
13	Kruppenneigung	Incline of croupe	0.24
16	Sprunggelenkwinkelung	Hock angulation	0.21
17	Fesselwinkelung	Shackle angulation	0.18
19	Schritt Raumgriff	Walk advance	0.24
20	Trab Raumgriff	Trot advance	0.39
22	Trab Elastizität	Trot elasticity	0.36
23	Korrektheit der Gänge	Soudness of movement	0.16

Source:  
Dr. F. Schmitz-Hsu (2004)



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3. The data material

## Correlations – abstract

(Total 24 traits profiling + 1 height + 3 traits judgment)

Merkmal A	Trait A	Merkmal B	Trait B	r
Stockmass	Height	Exterieur Typ	Exterieur type	0.54
Exterieur Typ	Exterieur type	Exterieur Körperbau	Exterieur conformation	0.82
Exterieur Typ	Exterieur type	Exterieur Gänge	Exterieur gaits	0.73
Ganaschen	Ganache	Halsmuskulatur	Neck muscularity	-0.38
Halsaufsatz	Neck top	Schritt Raumgriff	Walk advance	0.08
Halsmuskulatur	Neck muscularity	Widerristhöhe	Withers heigth	-0.22
Widerristhöhe	Withers heigth	Widerristlänge	Withers length	0.21
Schulterlänge	Length of shoulder	Schulterneigung	Incline of shoulder	0.53
Schritt Raumgriff	Walk advance	Trab Raumgriff	Trot advance	0.68
Trab Raumgriff	Trot advance	Trab Schub	Trot engagement	0.98

Source:  
Dr. F. Schmitz-Hsu (2004)



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3. The data material

### Multitrait animal model

$$V_{ijkl} = \text{Ort} * \text{Datum}_i + \text{Experte}_j + \text{Geschlecht}_k + b_1 * \text{Alter}_l + b_2 * \text{Alter}_l^2 + \text{Tier}_l + \text{Rest}_{ijkl}$$

**28 traits:**

- 1 height, 3 exterior judgment,
- 24 traits linear profiling

**Scoring scale 1-9**

**Corrected (environmental) factors:**

- event (place, date)
- expert/classifier
- gender
- age (during profiling)

wobei:

- $V_{ijkl}$ : Bewertung Exterieur / Stockmass / Lineare Beschreibung, total 28 Merkmale
- Ort\*Datum<sub>i</sub>: Einfluss von Ort\*Datum der Beschreibung (fix)
- Experte<sub>j</sub>: Einfluss des Experten j (fix)
- Geschlecht<sub>k</sub>: Einfluss des Geschlechts des beschriebenen Pferdes (fix)
- $b_1$ : Regressionskoeffizient Alter linear
- Alter<sub>l</sub>: Alter des Pferdes l bei der LB
- $b_2$ : Regressionskoeffizient Alter quadratisch
- Tier<sub>l</sub>: Einfluss des Pferdes (genetischer Einfluss = ZW) (zufällig)
- Rest<sub>ijkl</sub>: Resteffekt (zufällig)



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3. The data material

### Publication of the breeding values

Total 28 traits

Stallion catalog – only an **abstract**:

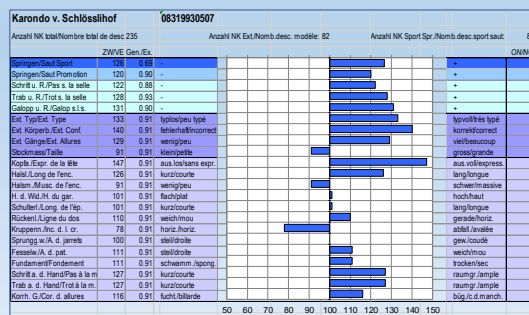
- 1 Height
- 3 traits judgment
- 13 traits linear profiling

**Conditions for publication:**

- > at least 10 descendants with linear profiling
- > determination minimum 0.5

**Indexing – base:** horses born 1999-2001

Indication of the **phenotypic optimal** note in the diagram

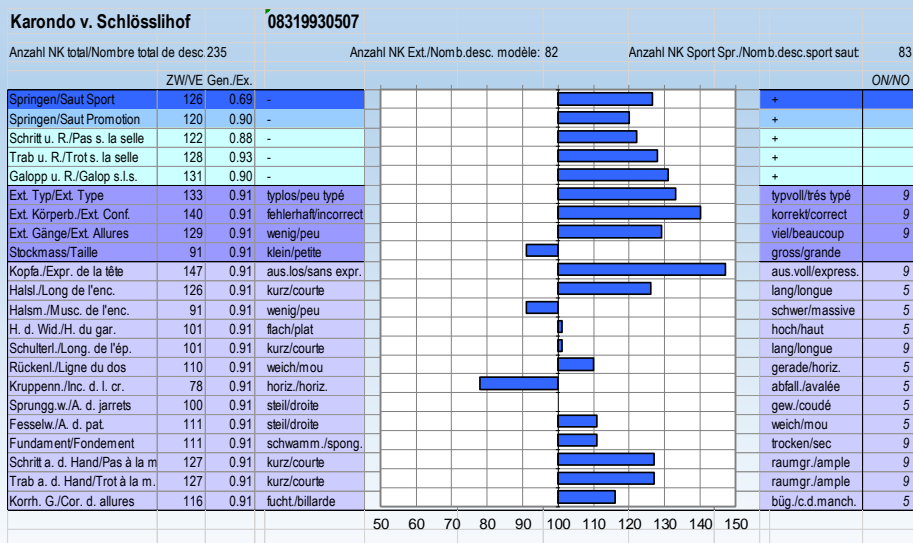


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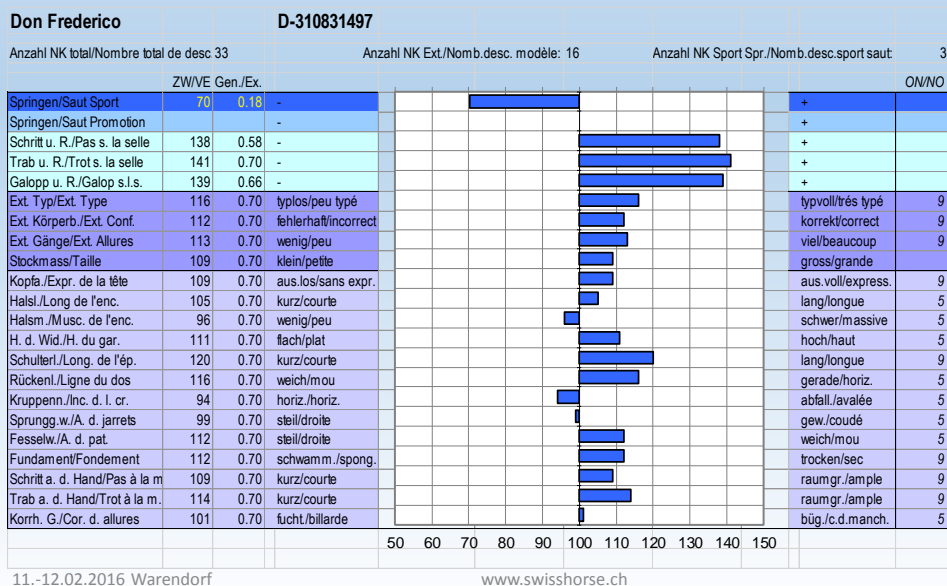
## 3. The data material

## Publication of the breeding values



## 3. The data material

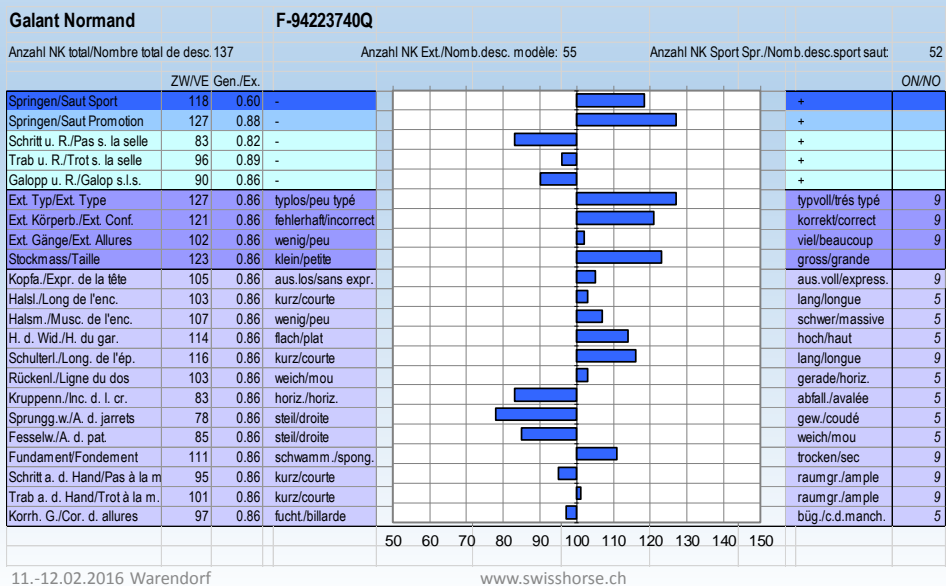
## Publication of the breeding values





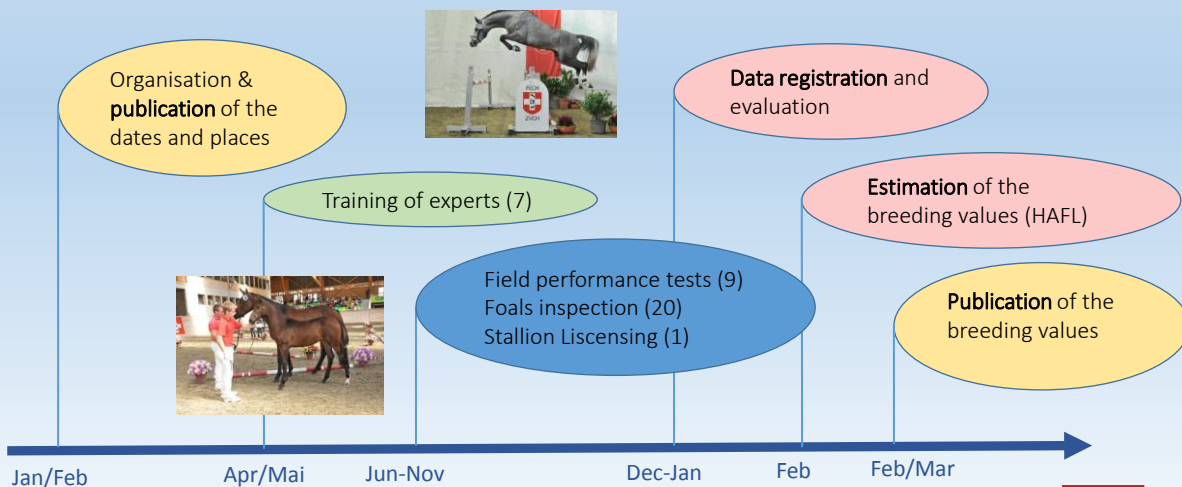
3. The data material

# Publication of the breeding values



4. The procedure

# Linear profilings of three year old horses



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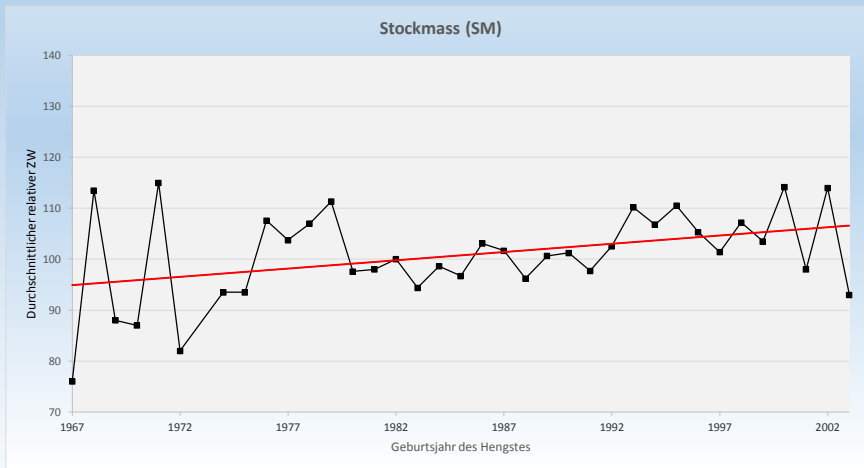
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5. Findings from 20 years

## Genetic Trends – Linear profiling

Average of breeding values of the stallions, basis: evaluation 2012



Height



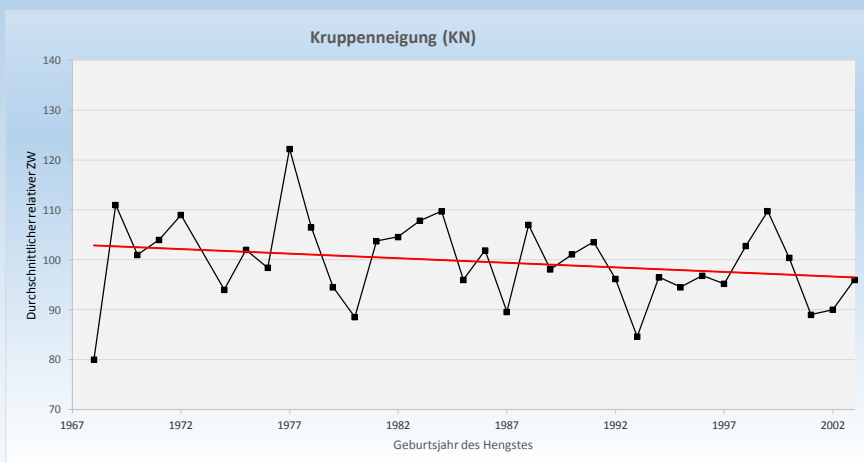
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## Genetic Trends – Linear profiling

Average of breeding values of the stallions, basis: evaluation 2012



Incline of croupe



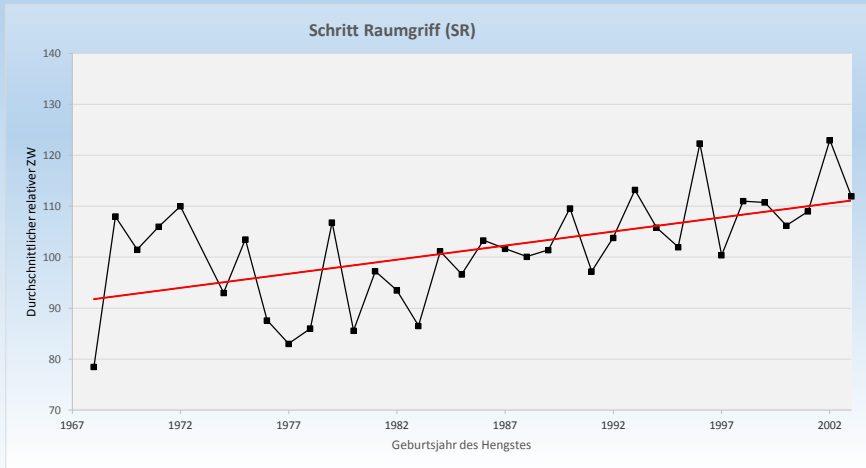
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5. Findings from 20 years

## Genetic Trends – Linear profiling

Average of breeding values of the stallions, basis: evaluation 2012



Walk advance



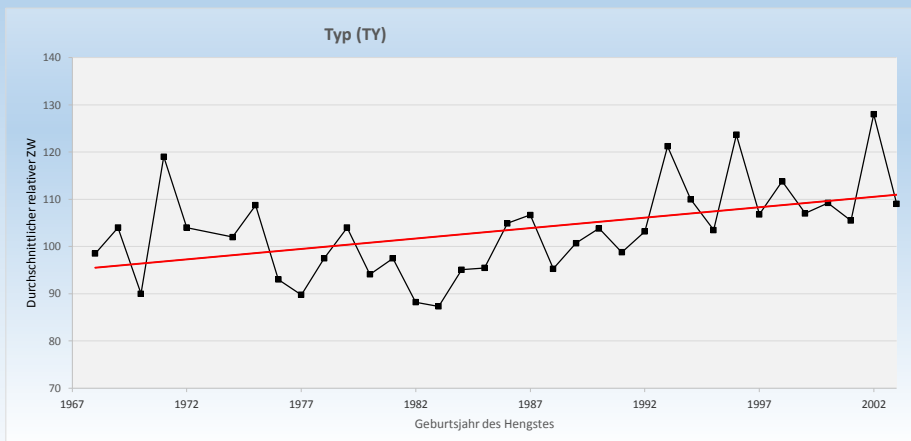
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5. Findings from 20 years

## Genetic Trends – Linear profiling

Average of breeding values of the stallions, basis: evaluation 2012



Type



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5. Findings from 20 years

## Stay clear and realistic!

### Data-Management – aim: minimizing the error rate

- reduction of the experts
- reduction of employees involved



### • Data-Publication – aim: low costs & high acceptance

- stay clear – for experts and breeders
- give first results directly on place



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5. Findings from 20 years

## Form or tablet? Find your own system!

### Advantages of the form

- easy to use for experts
- first results direct on place  
(A sheet of paper in the hand of the breeder!)
- independence of electricity and technique (*in the first step* 😊)
- suitable for training and explanation



### Disadvantages of the form

- a little bit «antiquated»
- manual data registration (Costs!)



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5. Findings from 20 years

## Benefits for the breeder

- Expansion of the knowledge of his horse
- Helpful in planning the covering of his mare
- Better understanding of the judgment



## Benefits for the breeding organisation

- Expansion of the knowledge of the breeding population
- Data collection as a basis for genomic selection
- Helpful in the training of experts and breeders



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5. Findings from 20 years

## And last but not least ...

- Not expect **too much** concerning the acceptance by the breeders!
- Remain **patiently** in explaining the interrelationships!
- If the breeders has accepted a system then it is
  - hard to make **changes** or
  - to **terminate** this system!



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**Do you have any questions?**

**Thank you for your attention!**

**And good luck with linear profiling... 😊**



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