



WBFSH

WORLD BREEDING FEDERATION  
FOR SPORT HORSES

# Breeding value estimation in Germany

*Dr. Teresa Dohms-Warnecke*

*German Equestrian Federation (FN)*

4 July 2023



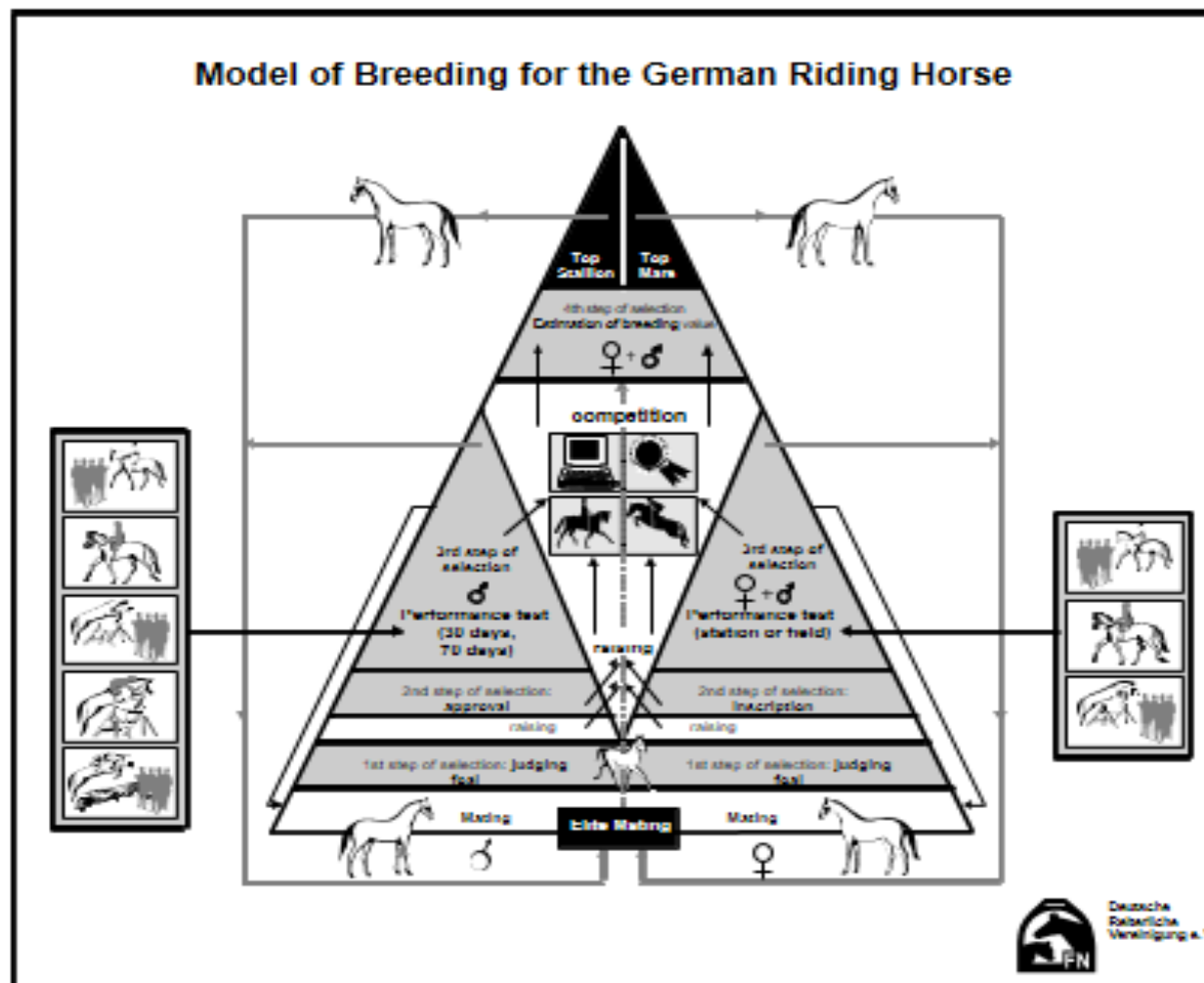
# BREEDING PROGRAM OF GERMAN HORSE BREEDING



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FOR SPORT HORSES

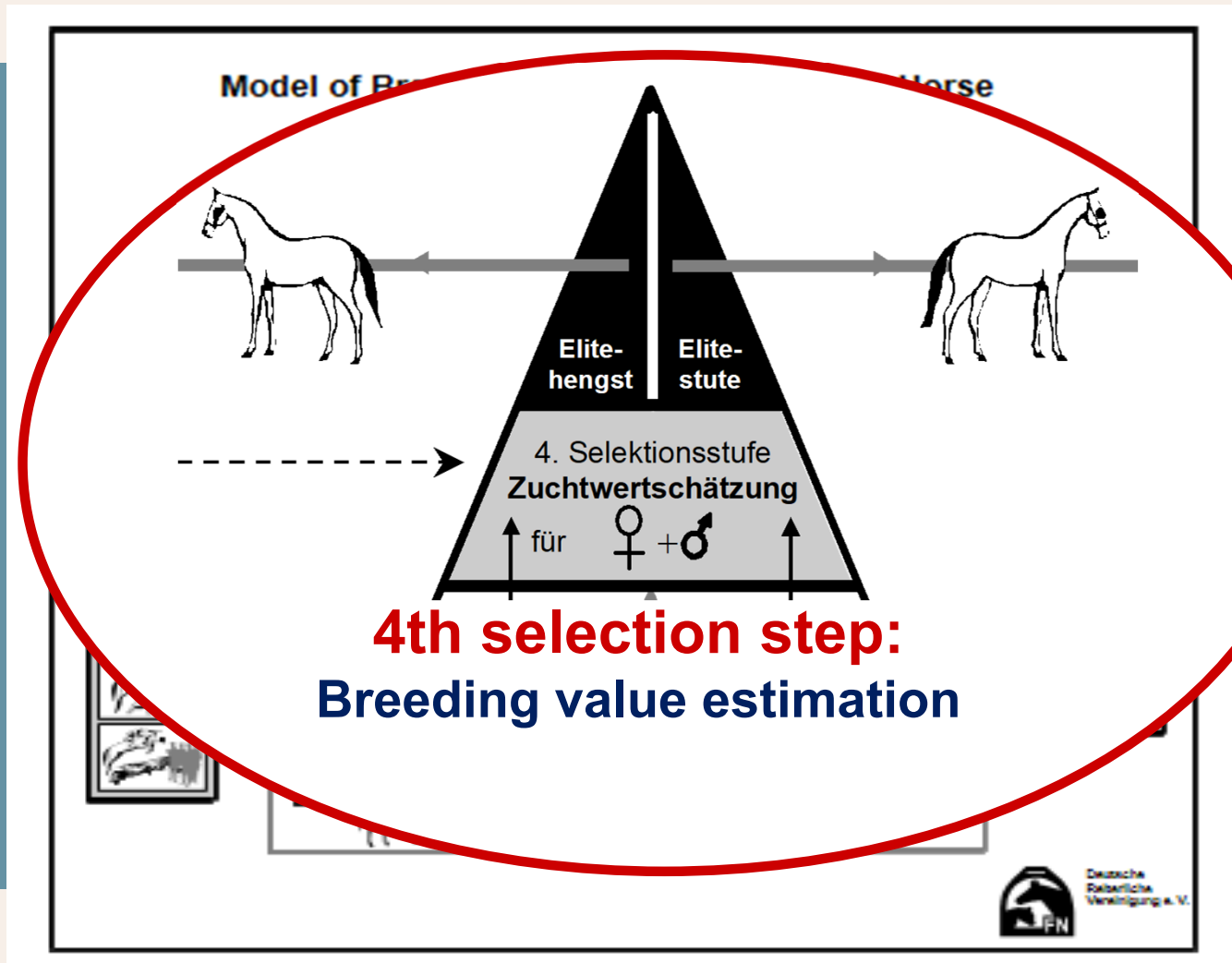
## Model of Breeding for the German Riding Horse



# BREEDING PROGRAM OF GERMAN HORSE BREEDING



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WORLD BREEDING FEDERATION  
FOR SPORT HORSES



# BREEDING VALUES – WHAT IS THAT?



## BREEDING VALUES...

... are the hereditary influence of animals on the performance of their offspring.

*(Definition in the Animal Breeding Law)*

... are expected values for the performance of offspring.

# BASIS ... Data in - Data out



7.1  
6.2  
6.5 1.  
7.1  
8.0 6.2 8.9  
6.5 1. 2.  
10 5. 2.  
8.0 7.6 8.9  
10 5. 6.2  
6.5 1. 2.  
6.9 1.  
8.0 8.9  
10 5. 2.  
6.9

MODEL

BV BV  
BV BV  
BV BV  
BV BV  
BV

# DATA BASE AND CHARACTERISTICS



## NATIONAL SPORT

show jumping and  
dressage competitions  
classes A, L, M, S

**ranking  
within  
test**



## INTERNATIONAL SPORTS (FN + FEI)

show jumping and  
dressage competitions  
classes A, L, M and S

**ranking  
of the German horses**

## NATIONAL SPORT

show jumping and  
dressage of young  
horses' competitions

**scores**

## BREEDING

performance tests  
of stallions and mares

**scores**

walk, trot, canter

rideability, free jumping

additionally in case of stallion performance test:

parcours jumping

# DATA AND CHARACTERISTICS



**breeding value estimation TSP**  
national show jumping and dressage competitions

**breeding value estimation HEK**  
national and international competitions



**breeding value estimation ABP and ZP**  
young horse competitions (ABP) and performance breeding tests (ZP)

additionally in case of HLP: parcours jumping

# DATA AND CHARACTERISTICS



**breeding value  
estimation TSP**

**JUMPING**

**327,572 horses**

**493,583 competitions**

**DRESSAGE**

**279,436 horses**

**347,501 competitions**



**INTERNATIONAL  
SPORTS (FN + FEI)**

show jumping and  
dressage competitions

Classes A, L, M and S

**ranking**

**of the German horses**

additionally in o

**breeding value  
estimation**

**ABP - JUMPING**

**256,837 horses**

**183,641 competitions**

**ABP - DRESSAGE**

**175,768 horses**

**71,683 competitions**

**ZP**

**113,246 stallions and mares**

**6,401 tests**



# THE MODEL ... a black box?



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MODEL

BV BV  
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BV

# FACTORS INFLUENCES PERFORMANCE

competition →

level of rider →

↑  
(e.g. experience, training)

↓  
age and sex →



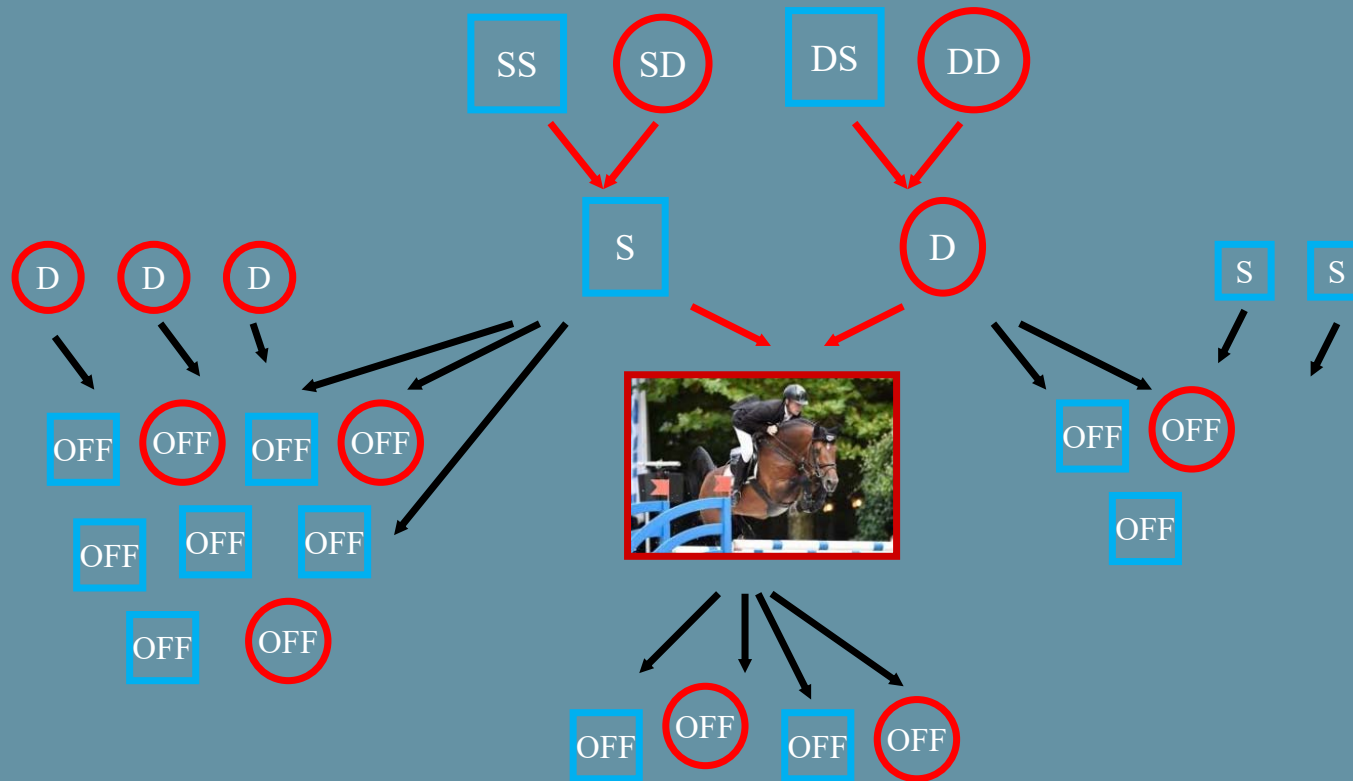
← breeding value

← permanent effect  
(e.g. education)

← rest  
(e.g. daily form)

# ANIMAL MODEL

*The animal model takes into account all pedigree relationships and uses all available information.*



S = sire  
D = dam  
OFF = offspring

# GENETIC PARAMETERS



breeding value  
estimation (TSP)

breeding value  
estimation  
(ABP and ZP)

Merkmal		TSP 1	TSP 2	ABP 1	ABP 2	ZP 3	ZP 4	ZP 5	ZP 6	ZP 7	ZP 8	
TSP	Springen	1	0,04	0,14								
	Dressur	2		0,08								
ABP	Springen	1			0,13	0,26	0,07	0,15	0,31	0,27	0,42	0,69
	Dressur	2				0,17	0,54	0,60	0,57	0,66	0,10	0,25
ZP	Schritt	3					0,22	0,55	0,52	0,56	0,10	0,04
	Trab	4						0,31	0,69	0,67	0,18	0,11
	Galopp	5							0,28	0,67	0,25	0,30
	Rittigkeit	6								0,24	0,17	0,18
	Freispringen	7									0,25	0,57
	Parcoursspringen	8										0,40

Heritabilities (diagonal) and genetic correlations (above diagonal)

# THE MODEL ... **not** a black box?



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6.9

## BLUP

- multitrait
- repeatability
- animal

## MODEL

BV BV  
BV BV  
BV BV  
BV BV  
BV

# THE RESULTS



7.1  
6.5 6.2  
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MODEL

BV BV  
BV BV  
BV BV  
BV BV  
BV

BV = Breeding values



# FN Erfolgdaten

Offizielle FN-geprüfte Daten aus Pferdesport & Pferdezucht

WBFSH

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FOR SPORT HORSES



PERSON

PFERD

TURNIERE

VEREIN & BETRIEB

ABOPAKETE

NACHSCHLAGEWERK

FA

Reitturniere mit Live-Turnierergebnissen. Die Erfolgsdatenbank aller Reiter und Pferde!



Schauen Sie sich schon heute  
die Beta-Version unserer  
**neuen FN-Erfolgdaten an!**

Relaunch FN-Erfolgdaten

Ergebnisse Schenefeld

Ergebnisse vom Wochenende

Unsere Abopakete



# BREEDING VALUES IN FN-ERFOLGSDATEN

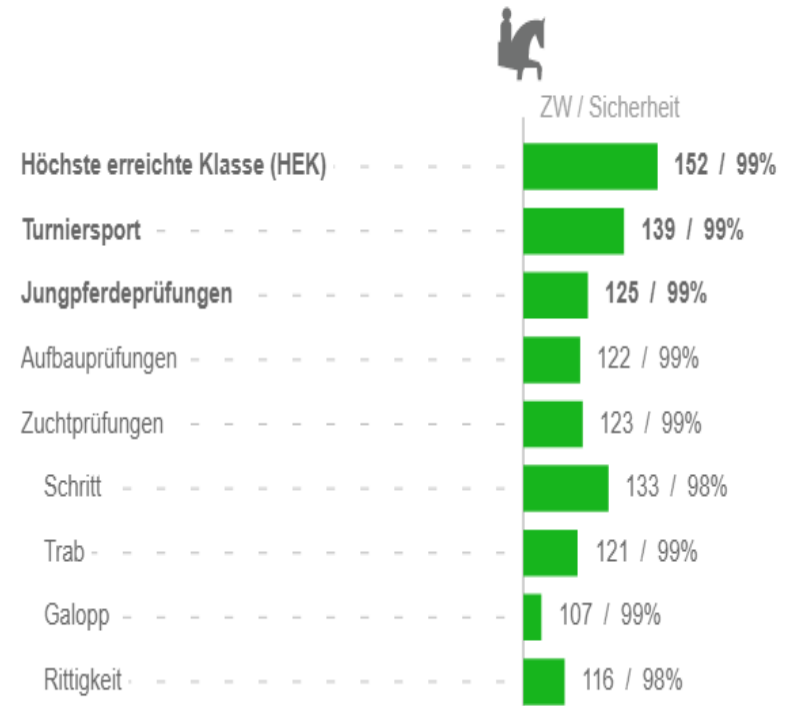
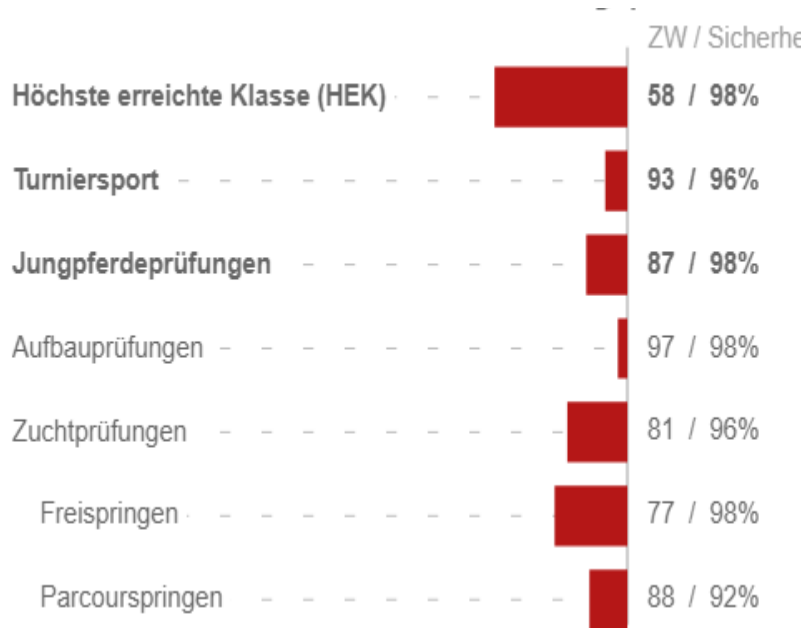
Datengrundlage Nachkommensleistung

Nationaler Turniersport und Zuchtprüfungen

- 50** Starts von 50 NK in Veranlagungsprüfung
- 1** Starts von 1 NK in Sportprüfungen für Hengste
- 52** Starts von 52 NK in Hengstleistungsprüfung
-  **11787** Starts von 371 NK in Turniersport (3937 Platzierungen von 242 NK)
- 481** Starts von 481 NK in Zuchtstutenprüfung
-  **3807** Starts von 371 NK in Aufbauprüfungen (1181 Platzierungen von 212 NK)
-  **12524** Starts von 1394 NK in Aufbauprüfungen (5662 Platzierungen von 933 NK)
-  **56202** Starts von 1485 NK in Turniersport (22832 Platzierungen von 1180 NK)

Internationaler und nationaler Turniersport

-  **1497** NKs gesamt mit 20 in höchster erreichter Klasse S4
-  **368** NKs gesamt mit 4 in höchster erreichter Klasse S3





# DATA AND CHARACTERISTICS



**breeding value estimation**  
**national and international competitions**  
**(HEK)**

additionally in case of HLP: parcours jumping

# DATA AND CHARACTERISTICS



breeding value  
estimation  
**HIGHEST LEVEL  
IN COMPETITION  
(HEK)**

additionally in case of HLP: parcours jumping

# DATE OF BIRTH AND CHARACTERISTICS



**breeding value estimation**  
**744,907 starts of German competition horses abroad**

additionally in case of HLP: parcours jumping

# Definition of HEK-traits



class	start	place (2nd-4th place)	1 <sup>st</sup> place
	at least 3 observations (1-2 observations)		
A	1.0 (-)	1.3 (1.0)	1.6 (1.3)
L	2.0 (1.6)	2.3 (2.0)	2.6 (2.3)
M	3.0 (2.6)	3.3 (3.0)	3.6 (3.3)
S - /*	4.0 (3.6)	4.3 (4.0)	4.6 (4.3)
s**	5.0 (4.6)	5.3 (5.0)	5.6 (5.3)
S***	6.0 (5.6)	6.3 (6.0)	6.6 (6.3)
S****	7.0 (6.6)	7.3 (7.0)	7.6 (7.3)
S***** = > 160 m	8.0 (7.6)	8.3 (8.0)	8.6 (8.3)

*IMPORTANT: the total number of starts or the number of successes in the highest class achieved is not taken into account*

*(accordina to Welker et al.. 2018)*

# FACTORS INFLUENCES PERFORMANCE

year  
of achieving the  
highest level

age  
of the horse  
at its latest start

sex



breeding  
value  
HEK

rest  
(e.g. daily form)



# HIGHEST LEVEL IN COMPETITION (HEK )

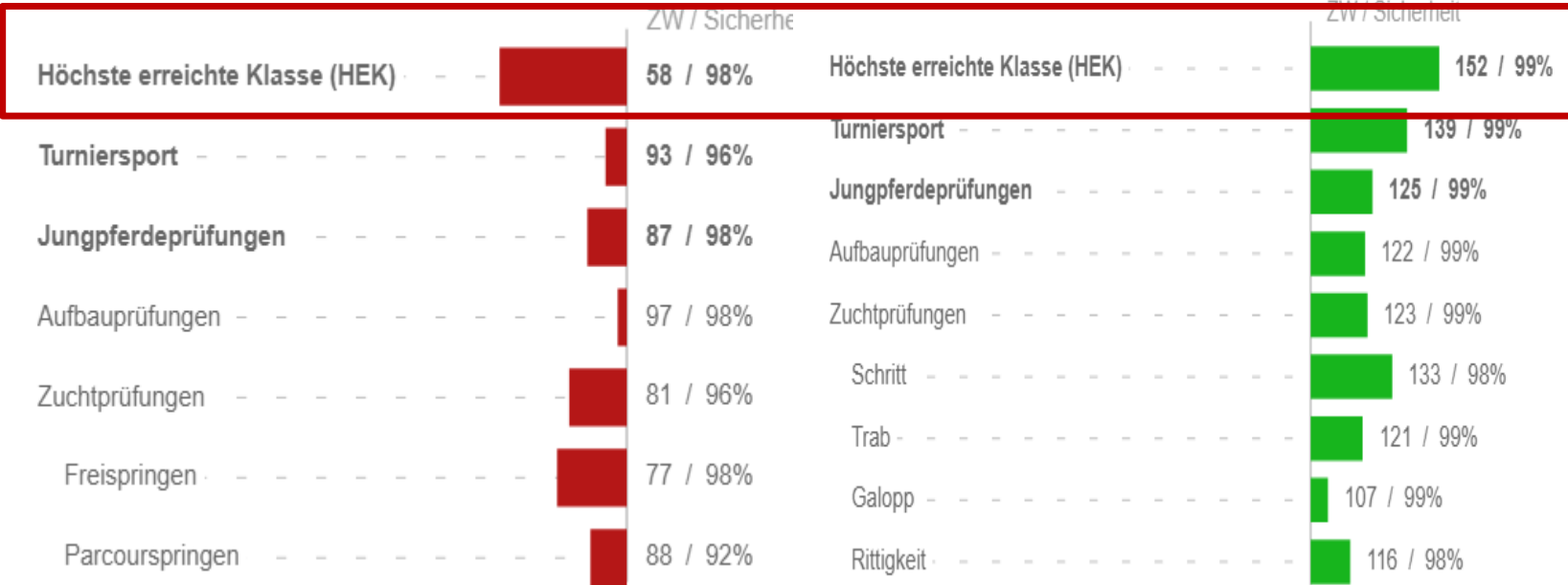
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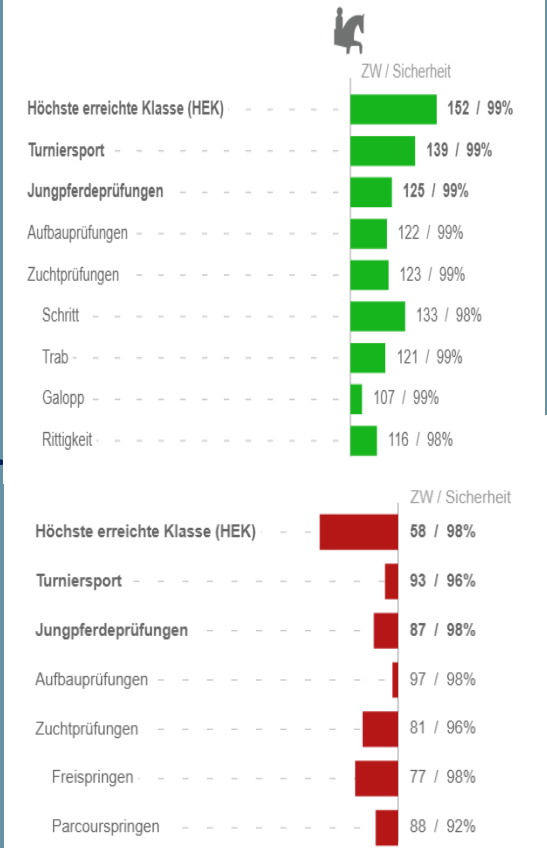


# PUBLICATION



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# MODEL



# PUBLICATION

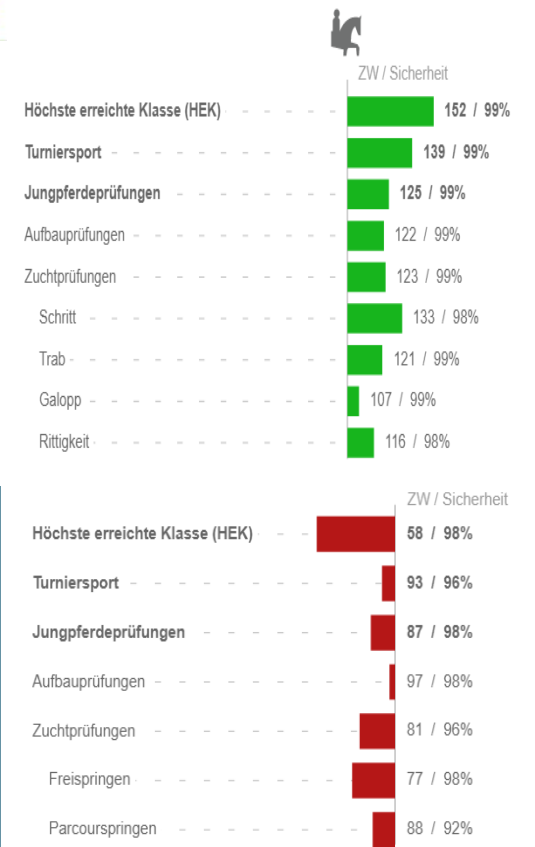


## BREEDING VALUES ARE PUBLISHED

... for stallions only

... respective reliability is at least 70 %  
and there are in total at least 5  
offspring having performance

... once a year in early December





# HOW IS USED?

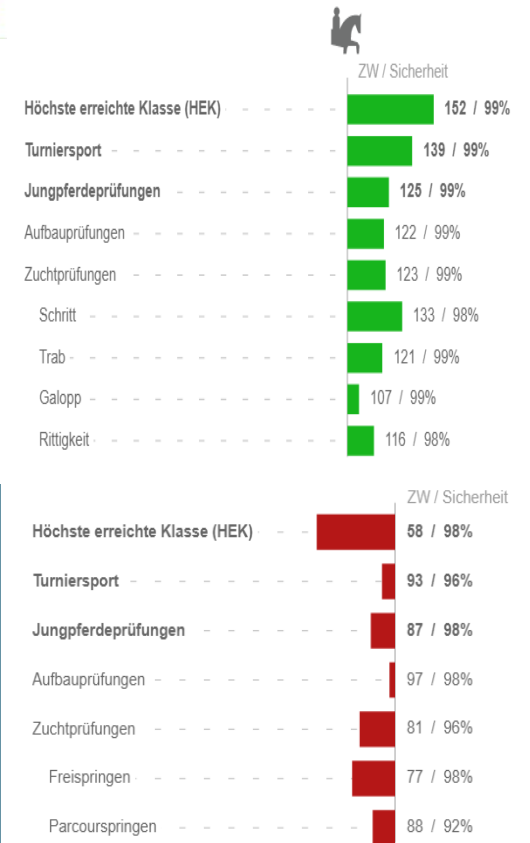


## Formation of elite breeding groups: “TOP ONE” or “TOP FIVE” of stallions and mares

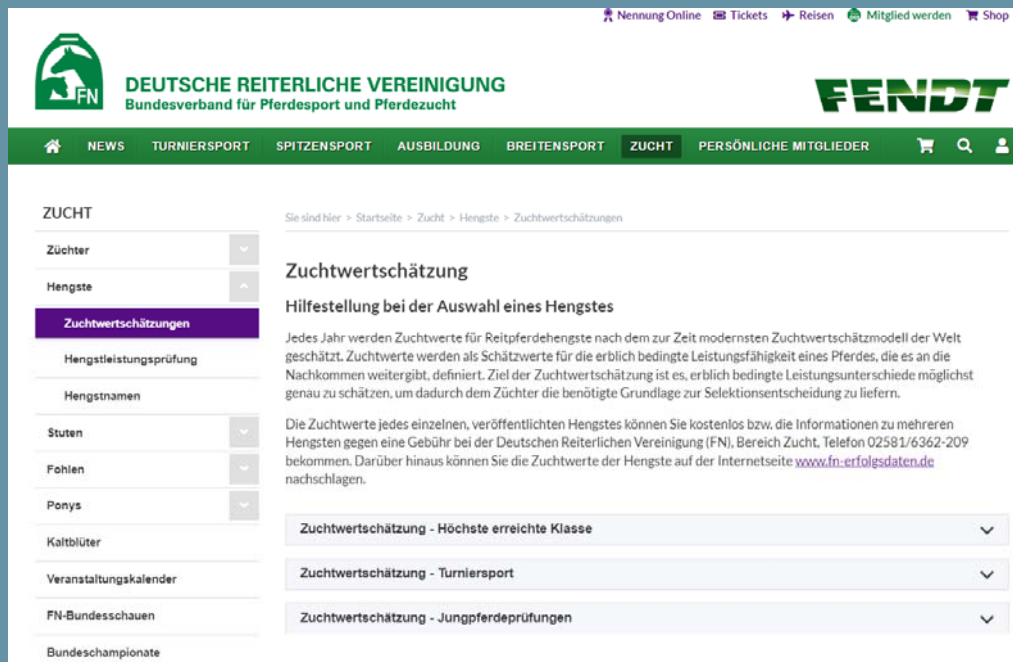


Tabelle 4: „Grenzen der Besten“ für veröffentlichte Hengste

ZWS 2022	Anzahl	Mittelwert	Std.abw.	25%	10%	5%	1%
ZW Springen JPf	3.518	95	23	114	126	133	141
ZW Dressur JPf	4.249	93	23	109	125	133	147
ZW Springen TSP	2.013	98	23	116	128	134	147
ZW Dressur TSP	1.964	94	21	109	124	132	148
ZW Springen HEK	2.000	98	27	117	135	145	166
ZW Dressur HEK	1.910	104	26	121	139	151	176



# HOW IS USED?



The screenshot shows the website of the Deutsche Reiterliche Vereinigung (FN) and FENDT. The navigation bar includes links for NEWS, TURNIERSPORT, SPITZENSPORT, AUSBILDUNG, BREITENSPORT, ZUCHT, and PERSÖNLICHE MITGLIEDER. The main content area is titled 'Zuchtwertschätzung' and provides information on how breeding values are determined and how to use them for selection decisions. It includes a sidebar with filters for breeders, stallions, and various horse types.



The screenshot shows the website 'FN Erfolgsdaten', which is the official database for breeding values. The navigation bar includes links for PERSON, PFERD, TURNIERE, VEREIN & BETRIEB, ABOPAKETE, and NACHSCHLAGEWERK. The main content area features a banner for the beta version of the database, highlighting that it contains official FN-verified data from equestrian events. Below the banner are links for 'Relaunch FN-Erfolgsdaten', 'Ergebnisse Schenefeld', 'Ergebnisse vom Wochenende', and 'Unsere Abopakete'.

Websites:

[www.pferd-aktuell.de/pferdezucht/hengste/zuchtwertschaetzungen](http://www.pferd-aktuell.de/pferdezucht/hengste/zuchtwertschaetzungen) and [www.fn-erfolgsdaten.de](http://www.fn-erfolgsdaten.de)



**DEUTSCHE REITERLICHE VEREINIGUNG**  
Bundesverband für Pferdesport und Pferdezucht



Deutsche Reiterliche Vereinigung e.V.  
FN ZWS Pferde 2022 Hengste veröffentlicht  
TOP 10 Prozent Hengste HEK Springen

N NK - Anzahl Nachkommen (number of offspring)  
ZW - Zuchtwert (breeding value)  
S% - Sicherheit (accuracy)

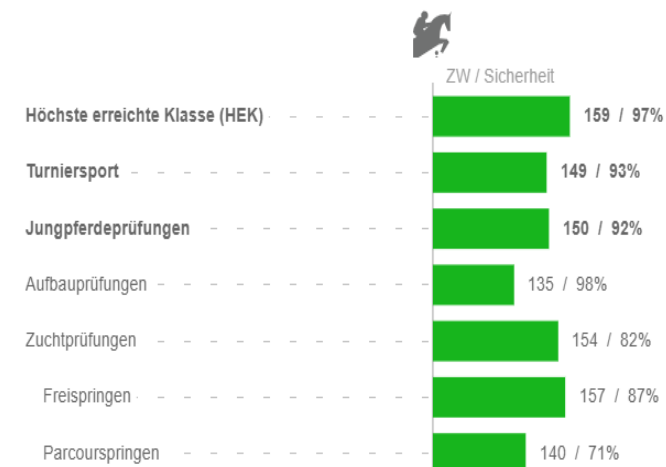
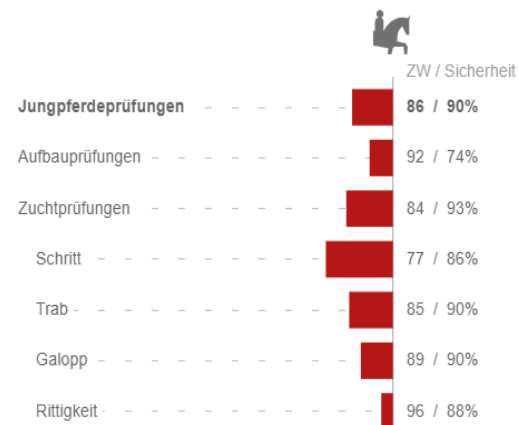


UELN	Name	Vater	Höchste Erreichte Klasse			Turniersportprüfungen			Jungpferdeprüfungen			Zuchtprüfungen			Aufbauprüfungen		
			N NK	ZW	S%	N NK	ZW	S%	N NK	ZW	S%	N NK	ZW	S%	N NK	ZW	S%
DE 321210122203	Cumano	Cassini I	37	196	84	33	148	73	12	131	75	1	136	67	12	119	75
BEL007000K28286	Kashmir van het Schuttershof	Nabab de Reve	120	185	93	120	165	86	37	119	73	1	115	54	37	120	83
BEL002W00233177	Emerald van het Ruytershof	Diamant de Semilly	82	182	91	78	144	81	90	137	81	8	132	65	87	135	91
DE 327271025908	Chacco-Blue	Chambertin	1324	181	99	1127	142	99	1202	139	96	97	146	89	1179	123	99
FRA00181499048E	Papillon Rouge	Jalisco B	34	179	88	34	165	79	9	122	70	2	120	52	7	121	78
FRA00189502005H	Baloubet du Rouet	Galoubet A	408	178	98	364	143	96	307	123	93	48	129	84	294	111	98
FRA00191446548F	Le Tot de Semilly	Le Tot de Semilly	472	174	98	427	156	96	455	138	93	70	137	84	419	132	98
BEL007000032608	Ogano Sitte	Daroo	84	174	91	80	147	82	74	144	81	10	141	67	70	138	89
NLD003198904335	Heartbreaker	Nimmerdor	154	173	96	152	162	94	69	143	88	6	141	76	67	137	94
BEL015255510499	Quasimodo Z	Quidam de Revel	93	173	92	89	144	83	47	127	76	2	130	60	45	118	85
BEL002W00229941	Eldorado van de Zeshoek	Clinton	169	171	95	158	128	89	172	136	85	11	138	67	168	127	94
DE 418180082405	Chacomo	Chacco-Blue	38	170	83	33	135	72	32	130	74	0	134	59	32	118	82
DE 321210003597	Calvaro Z	Caletto I	204	168	96	188	138	92	119	128	86	2	127	71	119	123	94
DE 441411627205	Comme il faut	Cornet Obolensky	421	167	98	381	155	95	548	146	93	63	147	84	520	135	98
BEL002W00163511	Toulon	Heartbreaker	261	167	97	238	141	93	222	131	89	27	134	78	211	121	96
DE 321210274304	Caspar (Berlin)	Cassini I	215	167	96	195	139	92	165	131	90	16	135	79	160	120	95
FRA00177037073A	Le Tot de Semilly	Grand Veneur	51	167	89	50	164	83	17	128	72	1	119	56	16	133	81
BEL002W00184083	Cornet Obolensky	Clinton	1013	166	99	898	132	98	1278	141	97	250	148	93	1186	123	99
DE 333330686795	Lord Pezi	Lacros	357	166	98	331	143	95	363	134	93	34	140	83	353	120	98
FRA00191412674X	Dollar Du Murier	Jalisco B	64	166	89	58	130	79	48	113	76	5	114	58	46	108	86
DE 441411785503	Cornado I	Cornet Obolensky	208	165	96	201	145	92	236	143	91	21	145	79	229	132	96
BEL015255568000	Cicero Z	Carthago	111	165	93	108	136	85	121	133	84	10	132	68	119	127	92
DE 321210021987	Carthago	Capitol I	577	164	99	559	143	98	614	140	97	180	139	93	537	133	99
DE 343433687389	Zandor (Zandor Z)	Zeus (Nurzeus)	65	164	89	64	138	82	46	109	75	1	111	57	46	99	86
FRA00175000588W	Jalisco B	Alme	21	163	89	23	146	86	5	116	80	1	118	69	4	110	85
DE 441411131805	Cornado II	Cornet Obolensky	41	163	85	39	144	75	46	138	79	4	139	64	46	129	86
BEL002W00001387	Daroo	Lugano van la Roche	317	162	98	307	148	96	215	136	92	28	133	81	204	133	97
DE 321210171892	Concerto II	Contender	119	161	95	116	142	91	133	137	92	36	142	85	120	123	95
DE 321210336595	Carvallo BB	Carthago	90	161	92	81	150	86	97	124	89	21	121	79	85	123	92
NLD003198804049	Mr. Blue	Couperus	93	161	92	92	149	85	40	124	79	4	121	63	38	123	86
DE 304040560482	Animo	Alme	73	161	92	74	144	86	32	115	74	1	114	54	32	113	86
DE 321210082087	Cash	Cor de la Bryere	69	160	91	69	148	86	79	113	86	15	112	75	76	111	91
DE 431312318501	Stakkato Gold	Stakkato	238	159	97	263	149	93	385	150	92	68	154	82	364	135	98
FRA00104375748B	Zirocco Blue (ex: Quamikase des Forets)	Mr. Blue	257	159	96	239	133	92	261	132	88	27	128	74	248	130	96
DE 304042203188	Lancio	Lancier	46	159	87	36	138	75	31	107	75	9	106	61	27	107	81
DE 441411496107	Chacco's Son I	Chacco-Blue	30	159	81	27	129	70	28	133	75	3	138	62	28	120	81
DE 321210159892	Cardento	Capitol I	232	158	96	218	143	92	152	132	89	12	134	78	147	122	95
DE 304048128072	Galoubet A	Alme	20	158	87	23	159	83	6	118	77	0	123	66	6	104	83
DE 404980037400	Mylord Carthago	Carthago	197	157	96	174	138	90	172	127	89	35	118	78	159	132	95
DE 331310256786	For Pleasure	Furioso II	576	156	99	536	134	97	623	128	97	141	137	93	566	110	99
FRA00182613448A	Quick Star	Galoubet A	283	156	97	272	155	95	241	119	92	35	118	83	226	115	97
DE 421000059204	Carambole	Cassini I	45	156	86	42	136	74	44	122	80	0	127	67	44	112	85
DE 321210236093	Clinton	Corrado I	241	155	97	226	125	94	177	129	91	19	137	81	170	114	96
DE 321210111681	Achill-Libero H	Landgraf I	155	155	96	153	130	93	142	121	91	29	127	83	129	110	95
DE 321210016878	Chin Chin	Constant	91	155	94	83	138	90	66	136	88	17	138	77	59	125	93



**FN Erfolgsdaten**

Offizielle FN-geprüfte Daten aus Pferdesport & Pferdezucht

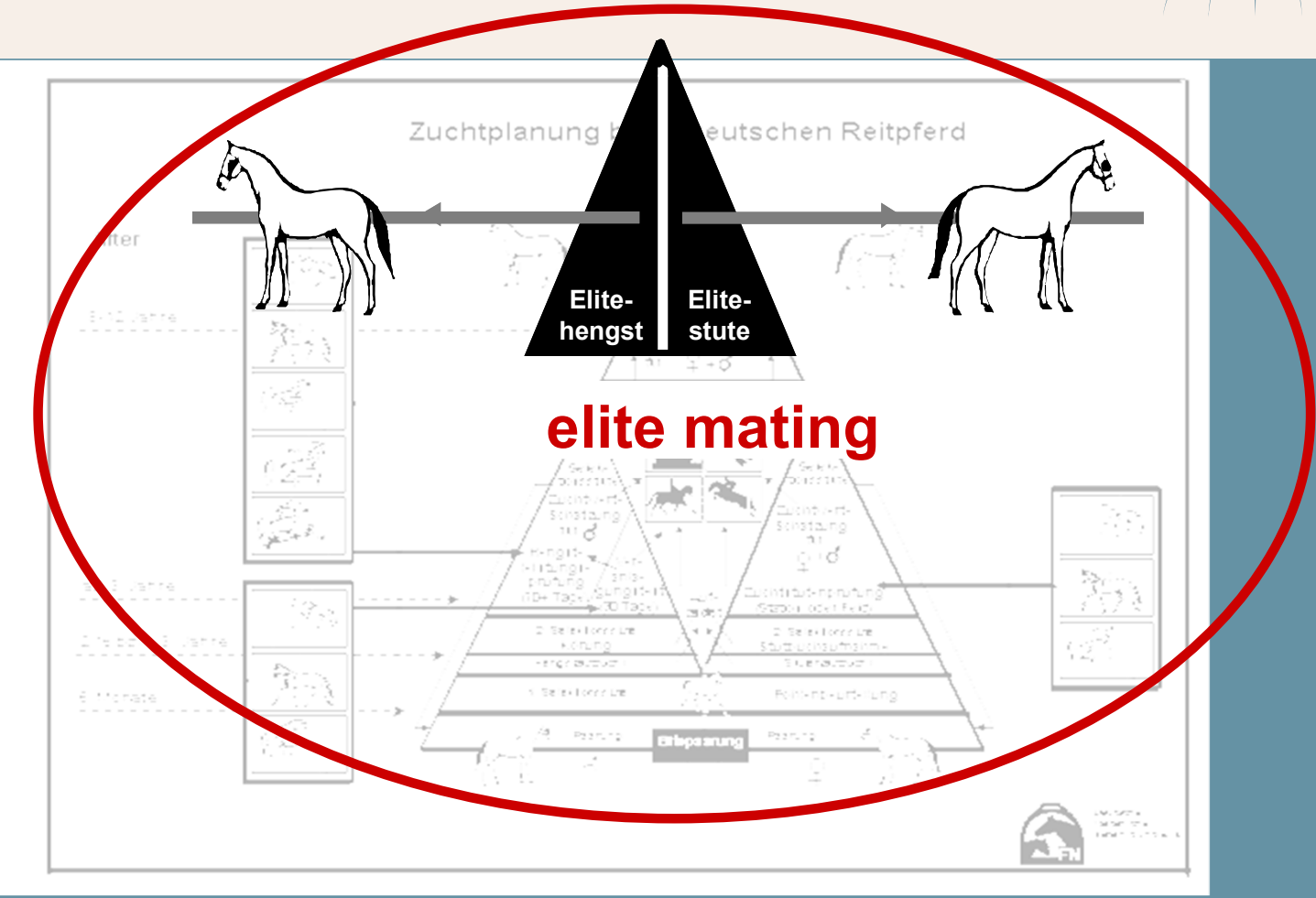


# BREEDING PROGRAM OF GERMAN HORSE BREEDING



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# GERMAN BREEDING VALUE ESTIMATION



## against progeny prize money

## REASONS

## for breeding value estimation

- ✓ no relation to age
- ✓ no differentiation according to prize money dressage and jumping
- ✓ selected data material (placed horses only)
- ✓ no consideration of
  - ... number and level of competitions
  - ... quality of the rider
  - ... environmental influences

- ✓ younger stallions attract attention
- ✓ all horses started
- ✓ considering the fix factors like age and sex ...
- ✓ comparability across stations and years
- ✓ more performance data per horse and thus earlier, more precisely, more accurately



# HOW IS USED?

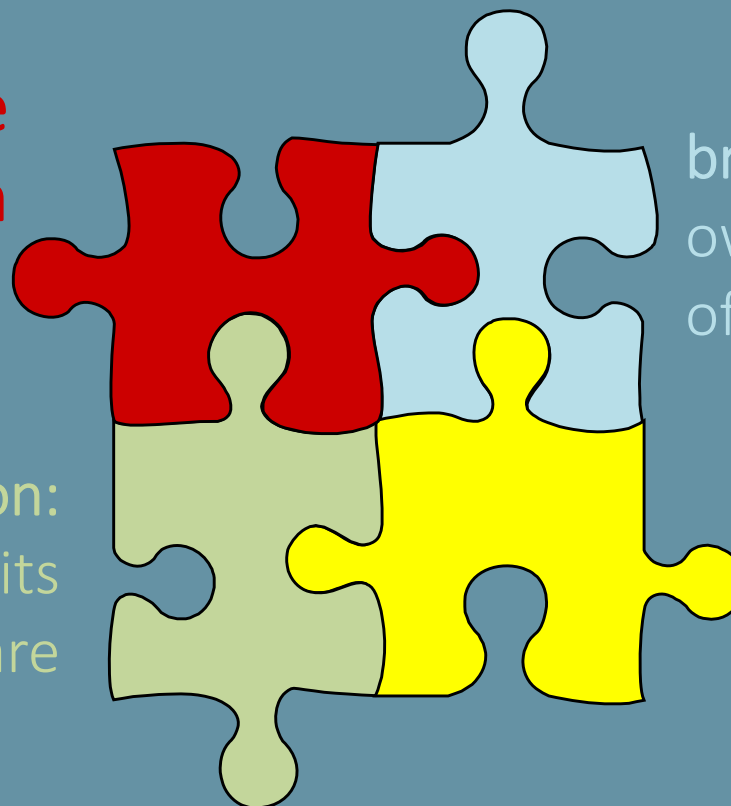


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FOR SPORT HORSES

breeding value  
estimation

mating decision:  
focus on the traits  
of your own mare



breeding eye:  
own evaluation  
of stallion and mare

breeding  
luck

*... no guarantee!*



THANK YOU VERY MUCH FOR YOUR ATTENTION!



**QUESTIONS?**  
*Dr. Teresa Dohms-Warnecke*  
*German Equestrian*  
*Federation (FN)*  
*[tdohms@fn-dokr.de](mailto:tdohms@fn-dokr.de)*