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Application Possibilities of Selection Indices in the Pannon Ka Rabbit Breed

ÁCS V., SZENDRŐ K., SZENDRŐ ZS., NAGY I.

Kaposvár University
Faculty of Agricultural and Environmental Sciences
H-7400 Kaposvár, Pf. 16
e-mail: acs.virag@ke.hu

Introduction I.

History of the Pannon Ka breed

- Maternal line
- Selected to LW21

Introduction II.

- The aim of animal breeding: To improve livestock genetically. (Breeding Value Estimation, Breeding goal)

- The traits in the breeding goal have different economic values.

Hazel (1943)
Selection index method

To insert the method in the Pannon breeding program is momentous due to:

- The reproductive traits inherit poorly
- They are not strongly correlated
- Their economic importance is serious

Materials and Methods I.

- Pannon Ka growing rabbits (1999-2016)
- n=5627
- 14 465 LW21 (Litter weight at 21 days of age) and NBA (number of kits born alive) data
- Estimation of the genetic parameters: REML procedure. The measured traits were analized jointly in a two-trait animal model (ASREML).

Materials and methods II.

The structure of the applied animal model

Effect	Type	Levels	Traits	
			LW21	NBA
AE	C	1	x	-
AGE 21	C	1	x	-
PARITY	F	4	x	x
YEARMONTH	F	193	x	x
A	A	5627	x	x
PE	R	3509	x	x

AE: ***Number of kits after equalisation***; **AGE21:** ***Exact age of the kits at 21 days of measurement***; **PARITY:** ***Parity number of the doe***; **YEARMONTH:** ***Year and month of kindling***; **A:** ***Additive genetic effect***; **PE:** ***Permanent environmental effect***

Materials and Methods III.

Calculating the selection index:

- SelAction software
- The final index was Z transformed and rank numbers were added to the individuals according to the index scores.
- 10-13 rabbits were selected from each buck group.

<u>The applied final index was:</u>

- Index=0.001*LW21+0.056*NBA
- (Mean=100; S.D.=20)

Materials and Methods IV.

Population size	
Number of selected male parents	12
Number of selected female parents	28
Number of male selection candidates per dam	100
Number of female selection candidates per dam	40
Total selected proportion male parents	0.13
Total selected proportion female parents	0.13
Characteristics of the used groups	
Full sib group 1 with	7 animals
Half-sib group 1 with	1 dam producing 8 animals
Progeny group 1 with	1 dam producing 8 progeny

Materials and methods V.

- Optimised mating plan was created with the selected sires and dams to maximise the best breeding values of the litters.
- In the next step the profit function was calculated
- Profit calculations: P=R-C, where

  P: Profit
  R: Returns
  C: Costs

- R=DGLa* PgR*NBA*LaSu*LW21
- C=LaCOf*NPt*NBA*([1+ LaSu]/2)*DFI*ND*Pr3

- *(CARTUCHE et al., 2014)*

Materials and Methods VI.

Prices and costs used in the profit function

Price per kg of doe feed (€/kg)	**0.3**	**Own calculation from the rabbit farm**
Price per kg of litter weight (€/kg)	**1.75**	**EADY and GARREAU (2012)**
Number of kits born alive per litter (€)	**9.88**	**Own calculation from the rabbit farm**
Fixed cost per offspring (€/doe/year)	**22.62**	**CARTUCHE et al., (2014)**

Materials and Methods VII.

The mean values assumed for the variables of the profit function according to the database of the University

Parameter	Amount
Pregnancy rate (%)	80
NBA	8.5
Daily feed intake of the doe (g/d)	190
Number of reproductive cycles	8
Lactation survival (%)	85
Weaning weight (kg)	0.85
Daily gain of the kits during lactation (g/d)	15

Results and Discussion I.

Heritabilities, genetic correlations and standard errors of the measured traits

Trait	LW21	NBA
LW21	0.1 ±0.01	0.16±0.06
NBA		0.06±0.01

- **The heritability of NBA is low**
- **The heritability of LW21 is moderate**

Results and Discussion II.

Litters selected by the traditional process

Buck groups	Number of litters	Number of selected litters	Mean of LW21 ranks	Mean of NBA ranks	Mean of index ranks
6	22	11	10.5	11.0	10.7
7	28	12	13.5	14.4	14.1
8	28	11	12.0	13.9	12.9
9	20	13	10.5	11.0	10.7
Buck group	**Number of litters**	**Number of selected litters**	**LW21_EBV**	**NBA_EBV**	**MI**
6	11	11	0.19	1.52	105
7	28	12	0.19	1.56	106
8	28	11	0.20	1.53	109
9	26	13	0.18	1.29	88.0

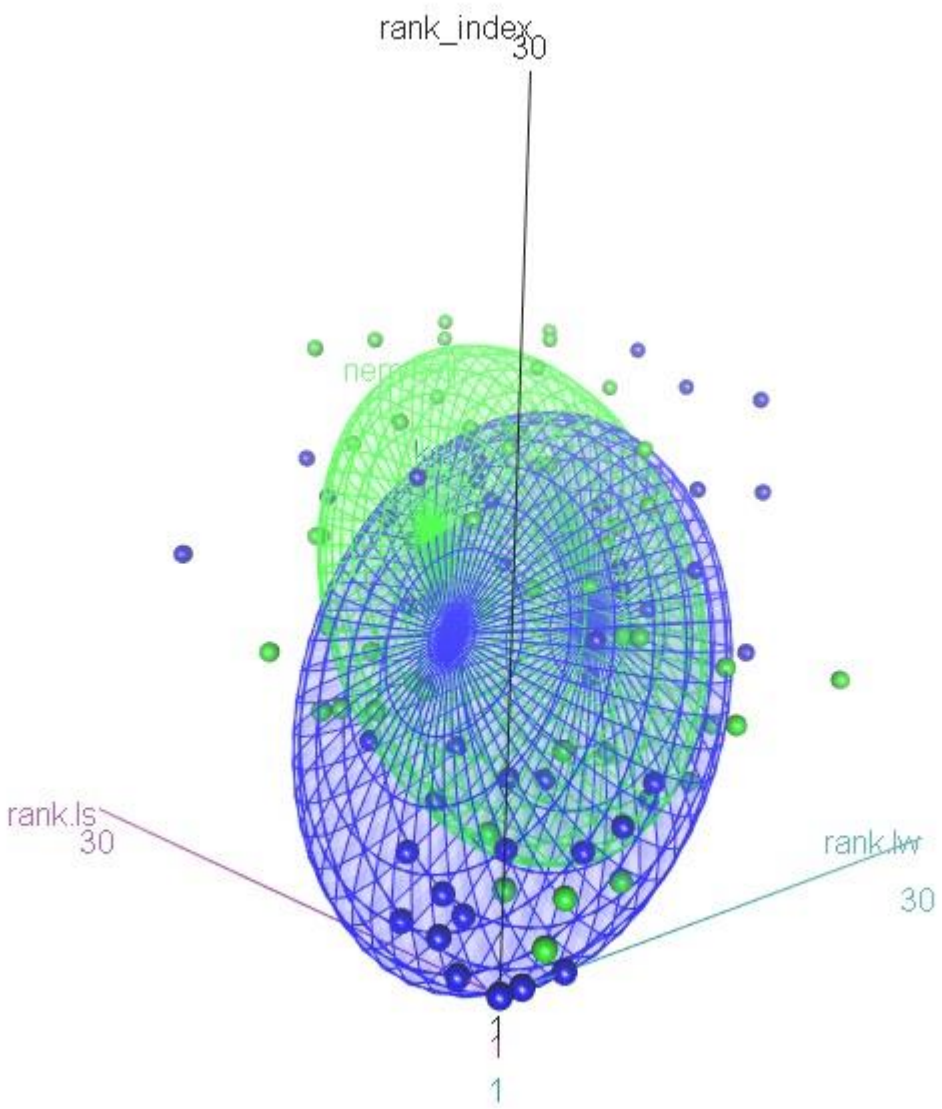
Results and Discussion II.

Litters selected by the index

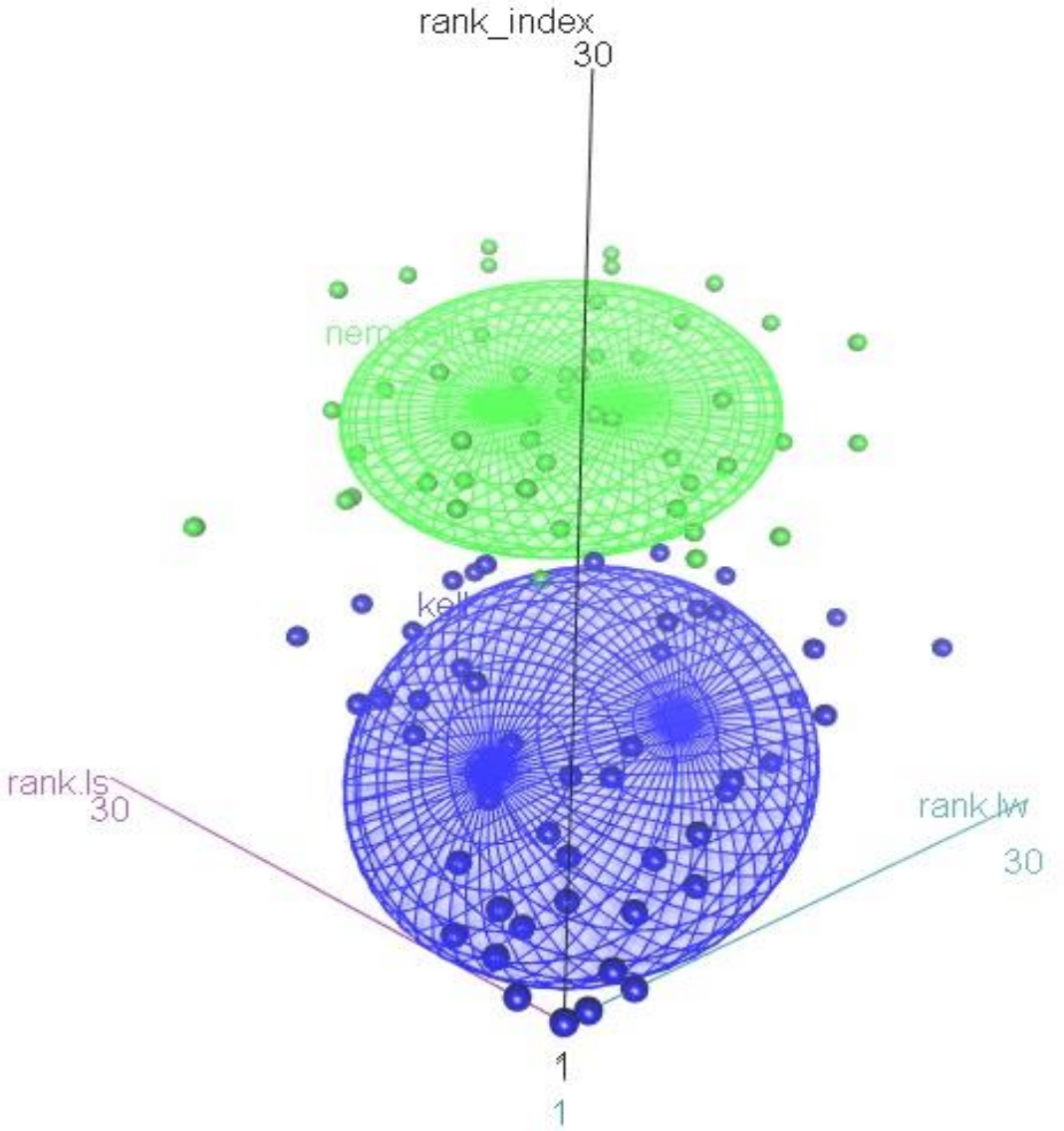
Buck groups	Number of litters	Number of selected litters	Mean of LW21 ranks	Mean of NBA ranks	Mean of index ranks
6	11	11	6.54	7.00	6.70
7	28	12	10.38	8.15	8.30
8	28	11	9.00	8.16	8.20
9	26	13	8.38	7.23	7.75
Buck group	**Number of litters**	**Number of selected litters**	**LW21_EBV**	**NBA_EBV**	**MI**
6	11	11	0.22	1.60	116
7	28	12	0.21	1.68	119
8	28	11	0.22	1.60	117
9	26	13	0.19	1.45	101

Results and Discussion III.

Regular selection



Index selection



Results and Discussion IV.

Profit increase with the selection index

Buck groups	Reduction in LW21	Progress in NBA	Profit increase/group (€)	Profit increase/ year/line (€)	Total profit increase(€)
6	-4,80%	8,08%	103,50	18216	71650
7	-6,17%	4,50%	99,00	17424	
8	-1,90%	6,40%	101,50	17864	
9	-4,70%	7,60%	103,1	18146	

Conclusions

- The improvement of reproductive traits with low heritability causes difficulties in breeding programmes
- Despite the decrease in LW21, a significant rise in profit was found in the increase of NBA. (According to Armero and Blasco (1992) and Cartuche et al. (2014) NBA was the most important trait in the selection index due to its economic value.)
- Making the Pannon Ka breed a succesful crossing partner an increase is needed in both traits
- With the application of the selection index method, the more profitable trait can be choosen.

Thank you for your attention

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