Fertility index for Austrian sheep and goats

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Content

Background (1)

- Functional traits of high importance in sheep and goat breeding
- Reproductive performance may be assessed by total number of offspring
- Improvement may be achieved by optimizing age at first lambing, lambing interval, number of lambs born, stillbirth rate, postnatal lamb losses, productive lifetime

Background (2)

- Fertility index was first implemented in 1998
- Target trait:
  (No lambs born+No lambs survived)/2
  within breed and age of ewe
- However:
  - only available for some sheep breeds
  - some problems with calculation
- Hence, development of revised index needed

Fertility index calculation

$FI_{new} = 100 + fsc*(b_{01}*(nl\text{-}nl_{exp})_{animal} + b_{02}*(nl\text{-}nl_{exp})_{dam} + b_{03}*(nl\text{-}nl_{exp})_{p.\ granddam})$

fsc = scaling factor (s = 12)

nl = (No lambs born + No lambs survived 48h)/2

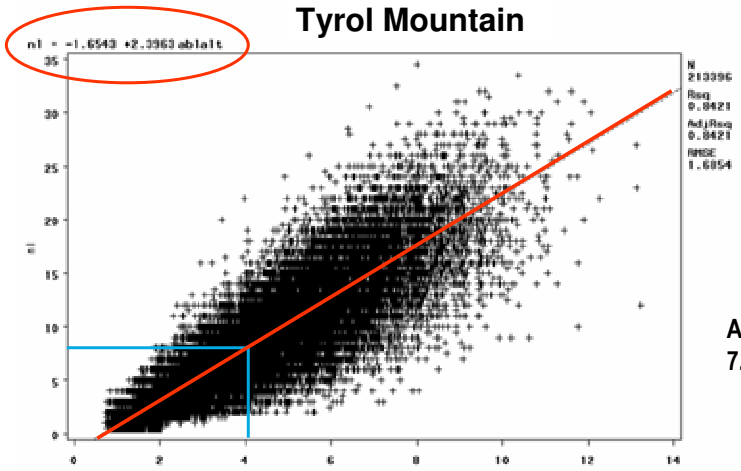
nl_{exp} = average nl for ewes of a specific breed at any given age

b = weights

Fertility index calculation nl_{exp}

- Target trait nl includes the single traits
  - age at first lambing
  - lambing interval
  - litter size
  - stillbirth rate
- Regression of nl on age of ewe
- Quadruplets and higher are considered as triplets

Fertility index calculation nl_{exp}



At 4 years:
7.93 lambs

Fertility index calculation nl_{exp}

Breed	Regression Equation
Tyrol mountain sheep	-1.654 + 2.396x
Merinoland	-2.220 + 2.501x
Black headed mutton	-1.108 + 1.926x
Eastfriesian sheep	-0.709 + 2.007x
White German Goat	-0.609 + 1.769x
Coloured German Goat	-0.594 + 1.781x
Saanen Goat	-0.439 + 1.748x

Fertility index calculation
Index weights

- based on performances of animal, dam, paternal granddam
- heritability of 0.10
- repeatability of 0.30
- dam and paternal granddam assumed unrelated

Fertility index calculation
Index weights

Animal		Dam		P. granddam		Accuracy
No. lambings	b_{01}	No. lambings	b_{02}	No. lambings	b_{03}	
1	0.100	0	0	0	0	0.100
1	0.095	5	0.103	0	0	0.146
1	0.094	5	0.103	5	0.051	0.158
5	0.215	5	0.089	5	0.044	0.270
5	0.215	10	0.106	0	0	0.268
10	0.270	0	0	0	0	0.270
10	0.253	10	0.101	10	0.050	0.320

Fertility index calculation

Example Tyrol Mountain Sheep

	Age at lambing (yrs)	No. lambings	Breed average at this age (nl_{exp})	nl
Animal	3.10	2	5.78	2.0
Dam	7.64	11	16.66	20.0
Granddam	4.52	5	9.18	5.5

b_{01} = 0.143, b_{02} = 0.118 and b_{03} = 0.049

FI = 100 + 19.34*((0.143*-3,78) + (0.118*3.34) + (0.049*-3.68))

FI = 94 (accuracy 21%)

Summary

- Target trait nl includes several traits
- Values of nl referring to breed average
- Heritability and repeatability taken into account
- Simultaneous derivation of index weights of animal, dam and granddam
- Scaled on 100 ± 12

Conclusions and prospects

- Fertility index intended to support management decisions
- Enables compensation of deficiencies
- Also applicable if one or two involved animals have no own performance – e.g. young ewes or breeding rams

Conclusions and prospects

- Simple breeding value estimation without taking environmental effects into account
- Has to be viewed as first step only
- Future developments should focus on breeding value estimation based on animal model

Links – Paper/Scientific report in German

http://www.raumberg-gumpenstein.at/cms/index.php?option=com_docman&task=doc_download&gid=1353&Itemid=53

https://www.dafne.at/dafne_plus_homepage/download.php?t=ProjectReportAttachment&k=214

Thank you for your attention!

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