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Qualitas

Genetic parameters of nematode resistance in dairy sheep

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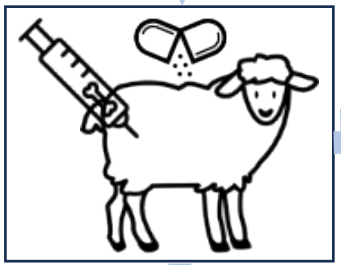
Introduction: Problem

(Morgan et al., 2013)

Gastrointestinal nematode (GIN) infections in pasture-based sheep production systems are omnipresent

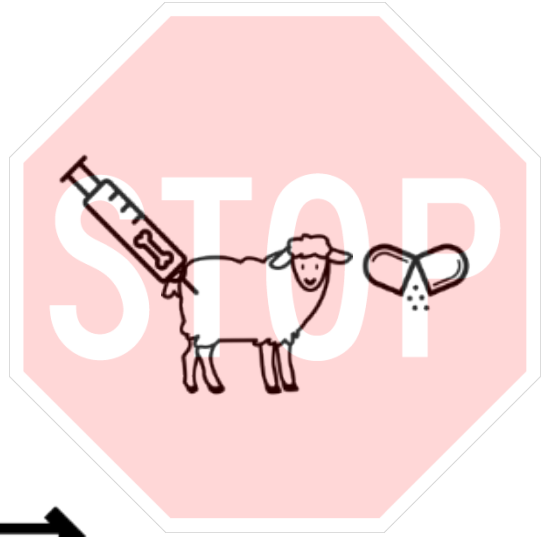


Resistant GIN population

Loosing efficiency

Negative impact on invertebrates

Introduction:
Other solution



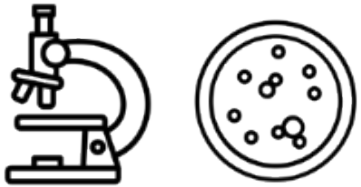
Alternative Strategy

Selection of sheep with lower susceptibility to nematode infection

Introduction: Selection

Selection of sheep with lower susceptibility to nematode infection

- Common trait: number of nematode eggs per gram faeces (FEC)

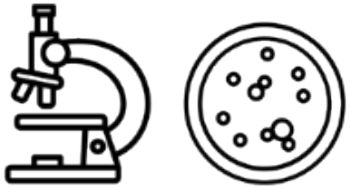


- FEC h^2 ~0.20

(e.g. Medrado et al., 2021; Hayward, 2022)

Introduction:
Auxiliary trait

Problem:



Solution?

FAMACHA© system

Measuring the infestation of *Haemonchus contortus* by the color of the conjunctiva

Introduction:
Topics of the study

Suitable as auxiliary trait for FEC?

Genetic parameters (h^2, r_g) of the traits included in the study

Traits: FEC, FAMACHA©, packed cell volume (PCV), milk yield (MY)

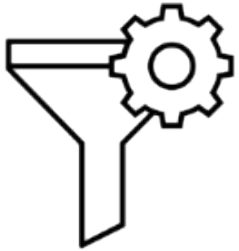
Material & Methods: Data

1208 **animals**, 1187 ♀, 21♂

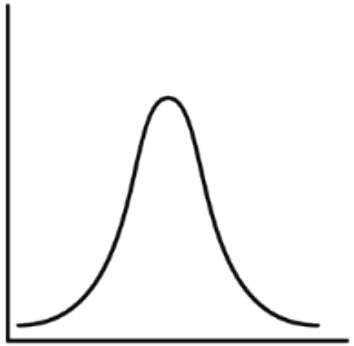
15 **farms** (herds), visited once between Aug and Dec 2019

Traits: **FEC**, **PCV** (both analyzed subsequently in the lab), **MY** (nearest official testday to the oberservation day), **FAMACHA©**

Material & **Methods:** Processes



Plausibility checks



for FEC (Box and Cox, 1964)

Material & **Methods:** Processes

- Descriptive statistics

- Statistical analysis with a multi-trait animal model with fixed and random effects
  (derived from Heckendorn et al., 2017)


Herd
(fix)


Month
(fix)


Days in milk
(fix)


Lactation number
(fix)


H. contortus class
(fix)


Animal
(random)


Residual
(random)

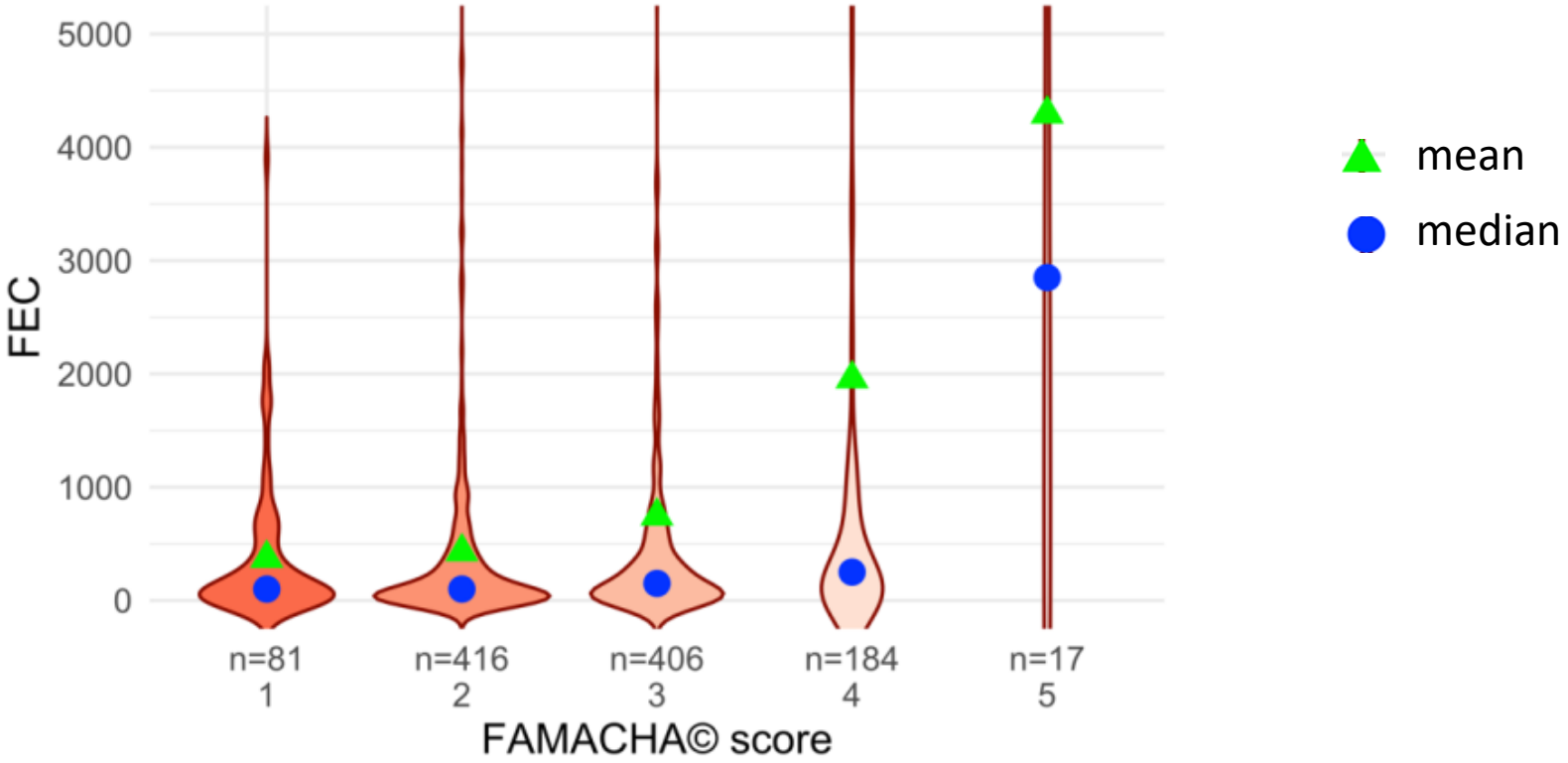
-  : BLUPF90+ (Misztal et al., 2022)

Results: Descriptive characterisation of the traits

Descriptive characterisation of the traits

Trait/Trait	n	Mean	Median	SD
FEC (n eggs/g)	1109	876	150	2365
FAMACHA © (score)	1104	2.7	3.0	0.9
PCV (%)	1101	31.1	31.0	4.0
MY (kg/d)	1109	1.4	1.2	0.7

Results: Phenotypic relationship between FEC and FAMACHA ©



Results: h^2, phenotypic correlations, genetic correlations

Trait/Trait	FEC	FAMACHA ©	PCV	MY
FEC	0.33 (0.08)	0.03 (0.22)	0.01 (0.21)	0.07 (0.22)
FAMACHA ©	0.25 (0.03)	0.30 (0.08)	-0.47 (0.19)	0.23 (0.21)
PCV	-0.36 (0.03)	-0.35 (0.08)	0.36 (0.08)	-0.11 (0.20)
MY	0.16 (0.03)	0.07 (0.03)	-0.20 (0.03)	0.34 (0.08)

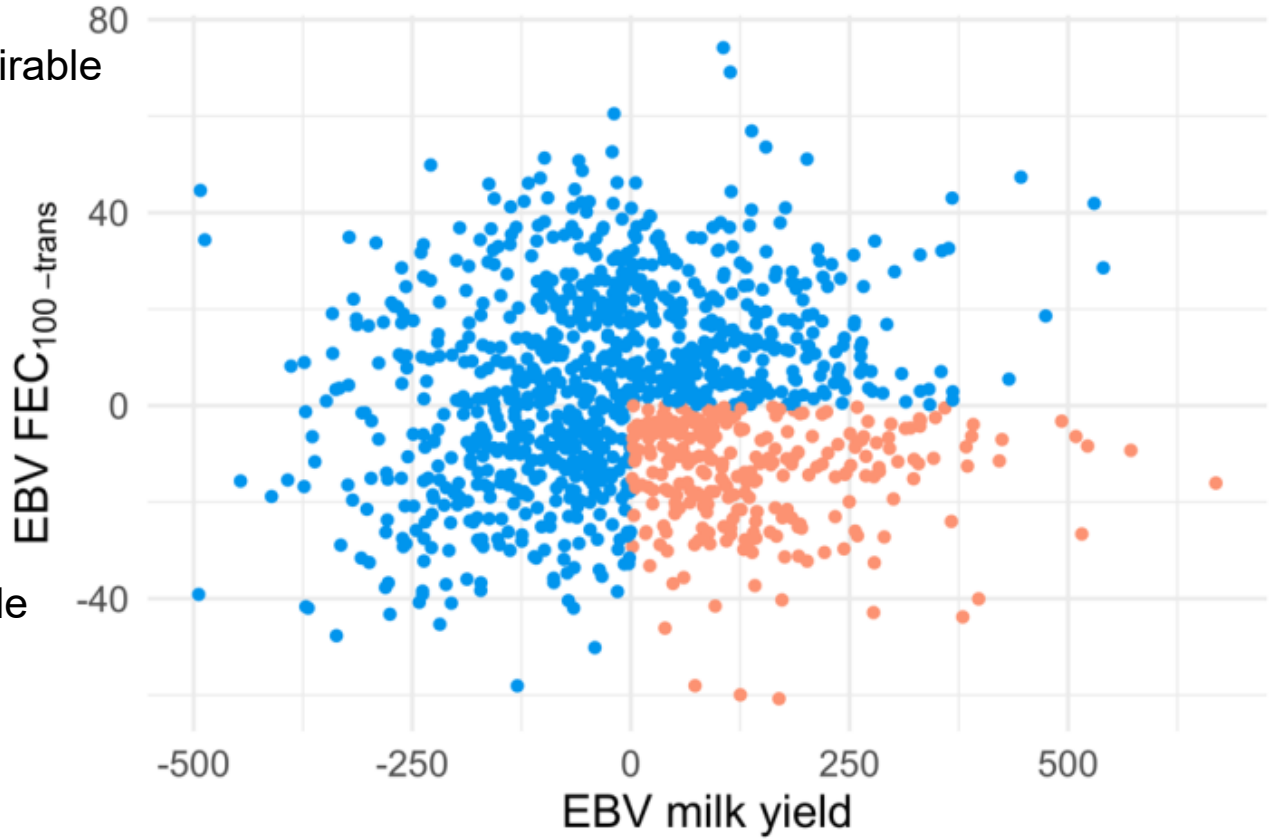
Summary and Discussion: achieved - not achieved

- Traits of interest are moderately heritable
- Genetic correlation of  and  was slightly positive
- FAMACHA© is not suitable as an auxiliary trait
- Selection is a tool against 

Summary and Discussion: animals for selection

not desirable

desirable



Summary and Discussion: But …

- Due to the high SE, the study would need to be extended and improved
  - for an improved FAMACHA © system → additional classes or
  - for more flocks

- A fast and cost effective auxiliary trait for  is still missing

Thank you for your attention

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