Effects of milk yield on animal welfare in dairy cattle

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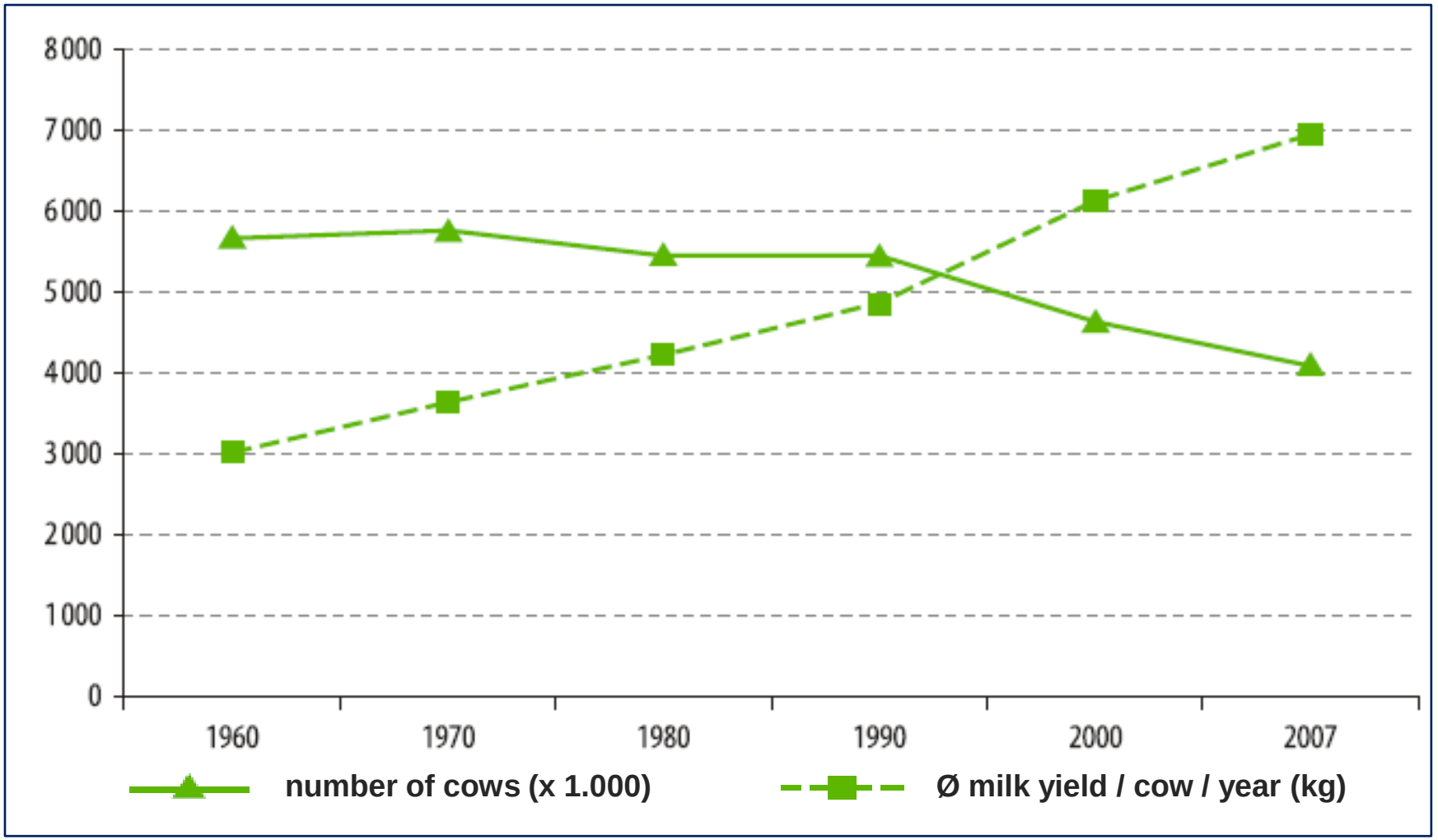
Introduction



(ÖKOLOGIE & LANDBAU, 2010)

Introduction

- Reasons for development: improved husbandry, optimized feeding and rapid progress in breeding (LUCY, 2001)

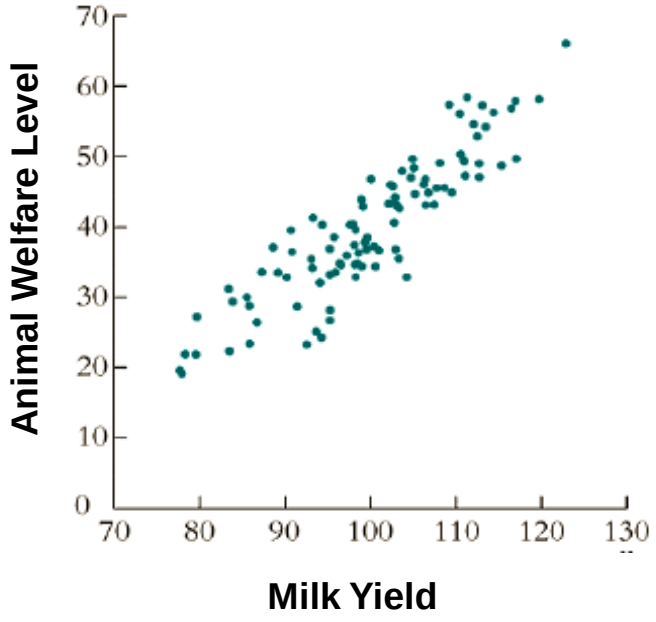
- Genetic antagonism: potential negative correlation between production and functional traits (KELM & FREEMAN, 2000; OLTENACU & BROOM, 2010), e.g. lameness, mastitis or metritis (INGVARTSEN et al., 2003; ARCHER et al., 2010; DE VRIES et al., 2014)

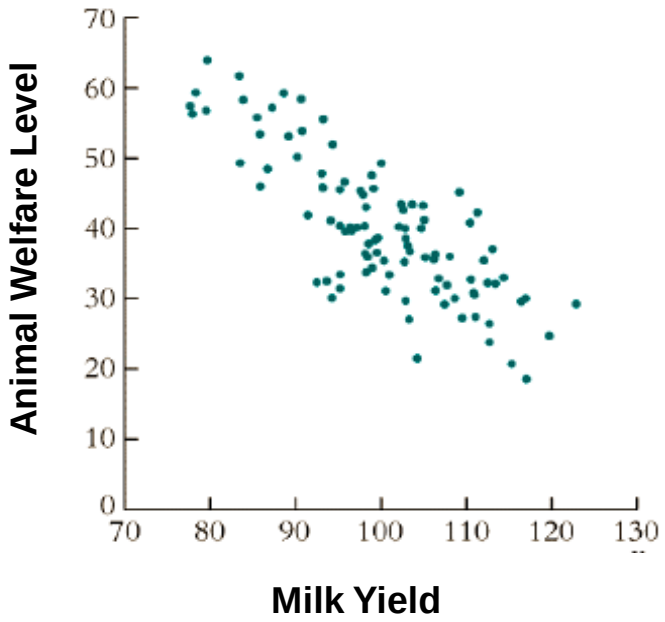
→ General impact of milk yield on animal welfare in dairy cattle?

Aims and Objectives

1) Is there a direct relationship between milk yield and animal welfare level?

2) Is the average milk yield a feasible indicator of the animal welfare level?

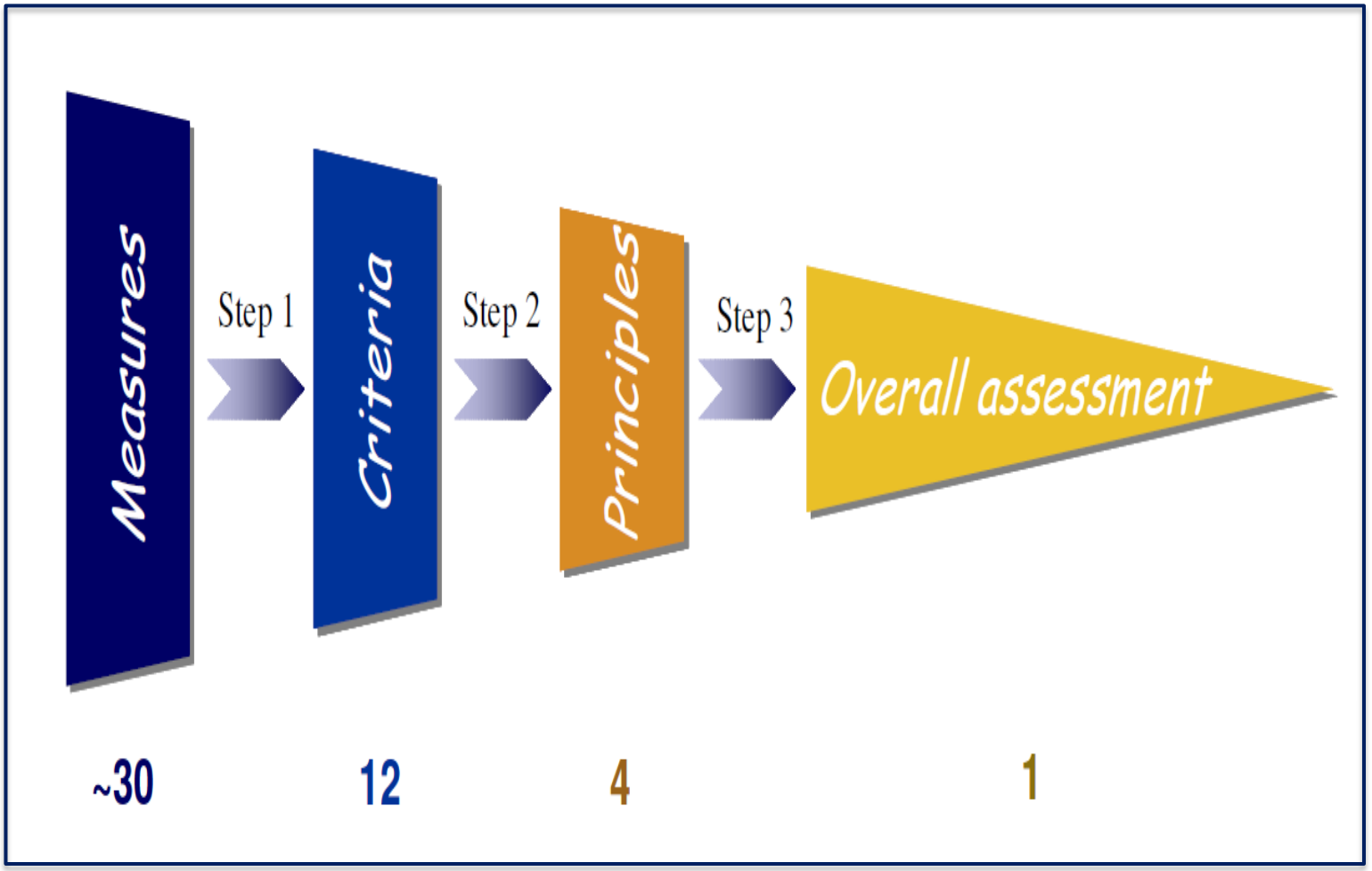


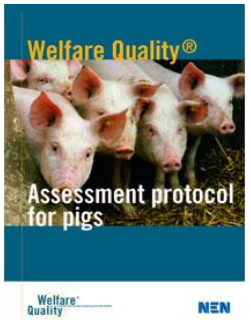


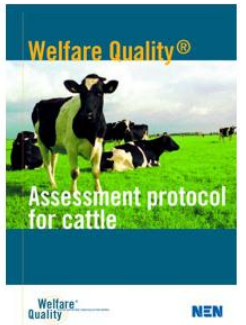
Material and Methods

- Sample: n = 40 dairy cattle farms from Northern Germany
- Requirements: conventional farming, zero grazing, loose housing system
- Application of the Welfare Quality® Assessment Protocol for cattle (WQP)

Material and Methods







(Modified from WELFARE QUALITY®, 2012)

Material and Methods

Measures	Criteria	Principles	Evaluation
Body condition score	Absence of hunger	Feeding	
Water provision, cleanliness (…)	Absence of thirst		
Time to lie down, collisions (…)	Comfort around resting		
- -	Thermal comfort	Housing	
Loose house vs. tie stall	Ease of movement		
Integument alterations, lameness	Absence of injuries		Overall Score
Diarrhea, mastitis, coughing (…)	Absence of disease	Health	
Dehorning, tail docking	Absence of pain		
Head butts, displacements (…)	Social behavior		
Access to pasture	Other behavior	Behavior	
Avoidance distance	Human-animal-relation		
Qualitative behaviour assessment	Emotional state		

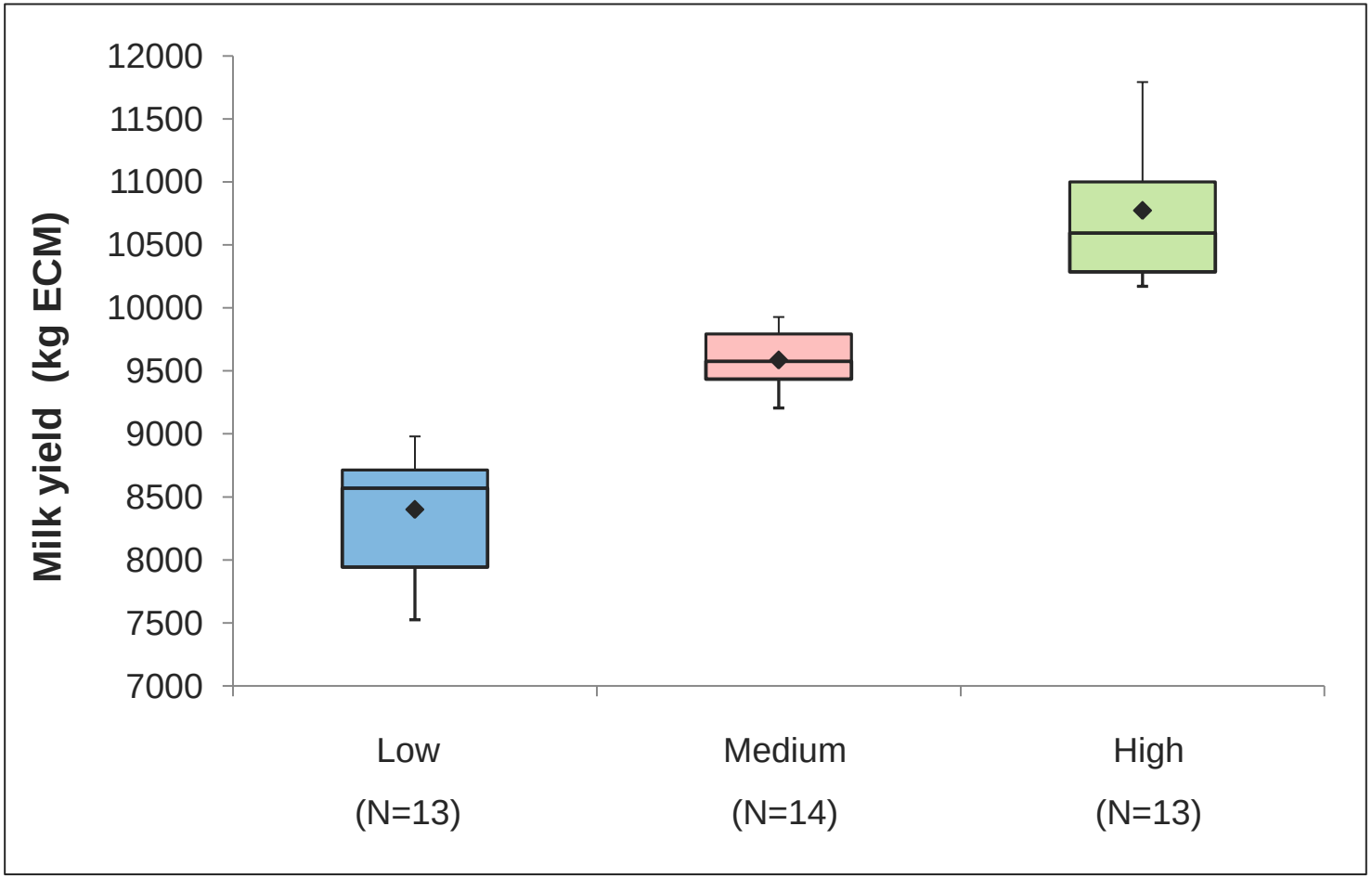
(Modified from VEISSIER et al., 2011)

Material and Methods

- Evaluation of official milk recording data (production + functional traits)
- Milk yield: Ø 9,618 kg milk (minimum 7,336 kg; maximum 11,710 kg)
- Milk composition: Ø 3.99 % fat (± 0.20 %) + 3.36 % protein (± 0.07 %)
- Standardized Energy-Corrected Milk (ECM) [4.0 % fat + 3.4 % protein]:
  ECM (kg) = Milk (kg) x [0.38 x F (%) + 0.21 x E (%) + 1.05] / 3.28
- Classification of farms by ECM (thresholds: 9,000/10,000 kg ECM)

„Low production“	„Medium production“	„High production“
< 9,000 kg ECM	9,000 – 10,000 kg ECM	≥ 10,000 kg ECM

Material and Methods



ME	8,401
SD	503
Min	7,525
Max	8,980

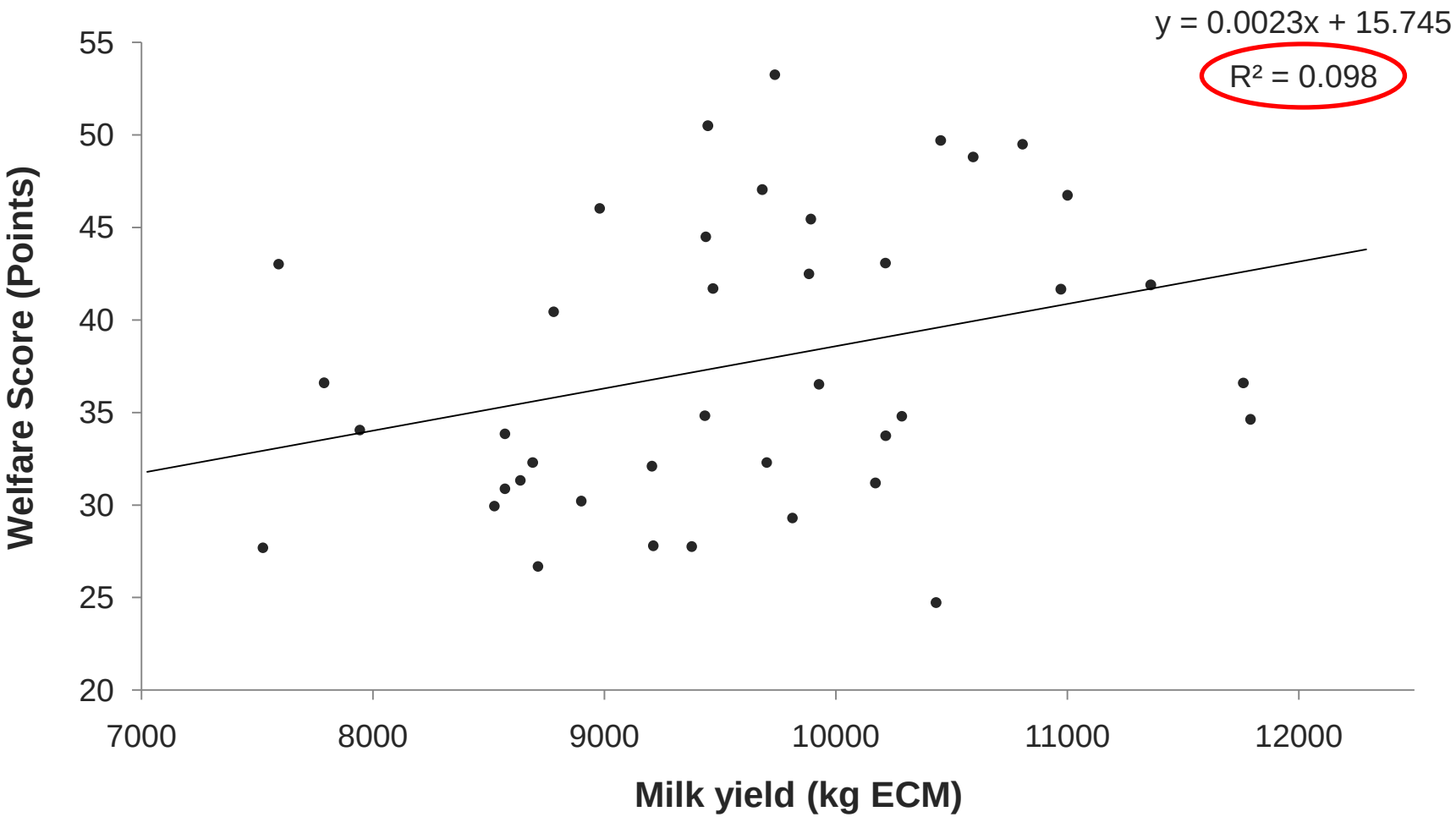
ME	9,587
SD	248
Min	9,205
Max	9,928

ME	10,774
SD	572
Min	10,171
Max	11,792

Material and Methods

- Data evaluation with Statistical Analysis Software (SAS® - version 9.3)
- Linear regression analysis to identify direct relationships between traits
- Comparison of performance groups based on Welfare Quality® Scores
- Focus on level of “Criteria”, “Principles” and “Welfare Score” (WQP)
- Logarithmic and Arcus-Sinus-Transformation (No normal distribution)
- Mixed linear model (Proc mixed); Significance level $p < 0.05$ (two-sided)

Results and Discussion



Results and Discussion

Criteria	Welfare Quality® Protocol	Low (N = 13)		Medium (N = 14)		High (N = 13)		Sig.
		ME	SD	ME	SD	ME	SD	P
	Absence of hunger	35.0	11.9	43.9	15.6	50.7	13.0	0.020
	Absence of thirst	29.8	43.0	51.9	43.1	38.5	42.4	0.407
	Comfort around resting	35.3	11.0	29.5	11.7	39.5	13.7	0.117
	Thermal comfort	-	-	-	-	-	-	-
	Ease of movement	100	0.0	100	0.0	100	0.0	-
	Absence of injuries	28.4	11.9	35.8	14.5	35.5	10.2	0.234
	Absence of disease	25.3	5.6	22.9	4.8	24.6	6.0	0.504
	Absence of pain	27.4	2.2	33.2	14.8	37.9	11.2	0.060
	Social behavior	87.3	6.4	85.5	7.1	81.8	9.7	0.206
	Other behavior	0.0	0.0	0.0	0.0	0.0	0.0	-
	Human-animal-relation	68.7	9.7	71.9	11.7	67.0	12.0	0.506
	Emotional state	64.5	15.2	71.5	15.2	73.8	15.3	0.283

Results and Discussion

	Welfare Quality® Protocol	Low (N = 13)		Medium (N = 14)		High (N = 13)		Sig.
		ME	SD	ME	SD	ME	SD	P
Principles	Good Feeding	18.6	18.2	36.8	24.8	31.0	25.3	0.128
	Good Housing	59.2	6.9	55.6	7.4	61.9	8.7	0.118
	Good Health	24.5	4.8	26.3	5.6	30.2	8.6	0.090
	Good Behavior	34.0	4.5	37.3	5.8	36.1	5.1	0.267

	Welfare Quality® Protocol	Low (N = 13)		Medium (N = 14)		High (N = 13)		Sig.
		ME	SD	ME	SD	ME	SD	P
Score	Welfare Score	34.1	5.9	39.0	8.6	39.8	7.9	0.127

Conclusions

- No significant effect of milk production level on animal welfare status
- No significant differences between the three performance groups
- No direct association between milk yield and animal welfare
- Milk yield is not a feasible indicator for animal welfare level in cattle

➢ **Limitation of this study:** Sample size and milk yield level ↓↑ ?

Acknowledgements

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Thank you for your attention!