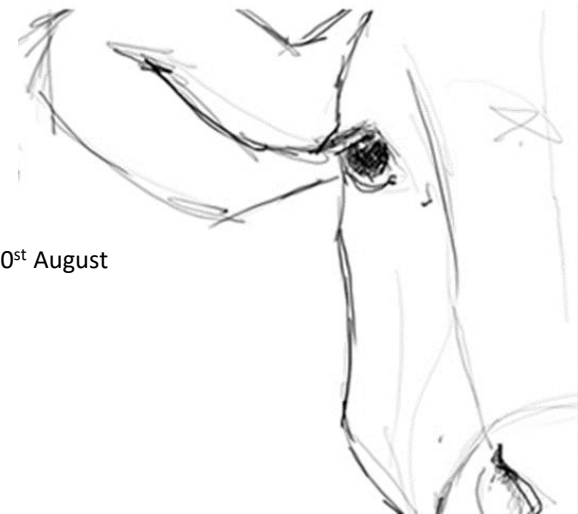


Effect of low and high concentrate supplementation on health and welfare in mountain dairy farms

L. Flach, S. Kuehl, C. Lambertz, M. Gauly
Faculty of Science and Technology
Free University of Bolzano

69th Annual Meeting of the European Federation of Animal Science, Dubrovnik, 27th to 30st August



Mountain dairy farms in South Tyrol

- Special conditions regarding:

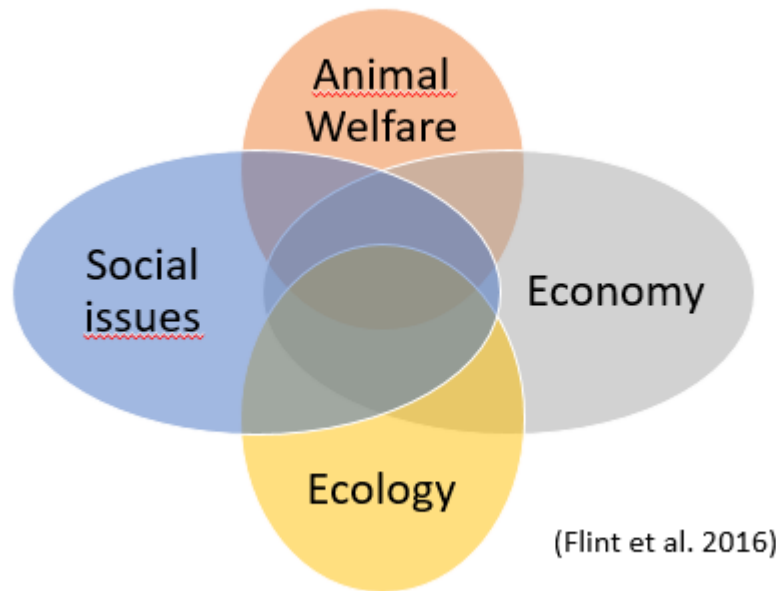
- Farm size
- Housing system = tie stalls
- Milk price
- Production costs, e.g. hay
- Import of concentrates

→ Not competitive with intensive production systems in most parts of Europe

Study Goals

- Comparison of production systems with low and high concentrate supplementation regarding sustainability
- Identification of the most sustainable system for South Tyrol

Sustainability of dairy farms



How does the amount of concentrate supplementation affects the overall outcome of dairy farms in South Tyrol?

Methods I

- Farm visits between October 2017 and May 2018:
 - 14 extensive, Tyrolean Grey farms (TG-Ex) (≤ 3.5 kg concentrate/cow and day)
 - 15 extensive, Brown Swiss farms (BS-Ex) (≤ 4.5 kg concentrate/cow and day)
 - 15 intensive, Tyrolean Grey farms (TG-Int) (≥ 6.0 kg concentrate/cow and day)
 - 20 intensive, Brown Swiss farms (BS-Int) (≥ 7.5 kg concentrate/cow and day)



Source: Südtiroler Grauviehzuchtverband, Südtiroler Braunviehzuchtverband

Methods II

Animal Welfare: Welfare Quality[®] protocol (Welfare Quality[®] 2009) & EFSA recommendations (EFSA 2015)

- Animal based
 - BCS
 - Cleanliness of udder, flank/upper legs and lower legs
 - Integument alterations
- Resource based
 - Housing system
 - Access to pasture (days/year)
 - Cleanliness and dimensions of lying area

Methods III

- ***Animal Health:***
 - Insemination and milk production data from test-day records
 - Records of veterinary treatments
- ***Economy:***
 - Full cost accounting & cost of forage harvesting (Peratoner et al. 2017)

Farm characteristics

	TG-Ex (N=14)	BS-Ex (N=15)	TG-Int (N=15)	BS-Int (N=20)
Altitude	1141 (\pm 324)	1266 (\pm 266)	1294 (\pm 261)	1120 (\pm 240)
Full time (%)	57	27	80	85
Herd size	12.2 (\pm 4.3)	10.1 (\pm 4.6)	13.6 (\pm 5.6)	14.8 (\pm 4.5)
% loose housing	15.4 ^a	8.3 ^a	7.1 ^a	41.2 ^b
Pasture (ha/cow)	4.6 (\pm 4.9)	6.4 (\pm 4.1)	6.1 (\pm 6.1)	0.14 (\pm 0.4)
Days of pasture	97.1 ^a (\pm 70.1)	76.7 ^a (\pm 47.7)	52.1 ^{ab} (\pm 56.8)	19.4 ^b (\pm 29.2)
Concentrate/cow and day (kg)	2.8 (\pm 0.8)	4.0 (\pm 1.5)	6.1 (\pm 1)	8.7 (\pm 1.3)
Kg ECM/cow and year	4220.0 (\pm 348.5)	5178.9 (\pm 708.5)	5747.8 (\pm 717.1)	7674.9 (\pm 1071.2)

Animal Welfare

	TG-Ex (N=14)	BS-Ex (N=15)	TG-Int (N=15)	BS-Int (N=20)
% of cows too thin	19.5 ^a (± 17.1)	39.3 ^b (± 22)	23.2 ^{ab} (± 17.2)	26.1 ^{ab} (± 12)
% of cows with injuries	6.4 (± 6.5)	4.9 (± 8.6)	10.2 (± 12.8)	16 (± 25.1)
% of cows hairless patches at back	2.5 ^{ab} (± 4.2)	10.8 ^a (± 17.9)	0.9 ^b (± 2.4)	4.2 ^{ab} (± 6.5)
% of dirty lying area	33.3 ^{ab} (± 39.2)	50 ^a (± 36.4)	15.5 ^b (± 24.7)	15.8 ^b (± 28)
% of cows with dirty hind leg	26.8 ^{ab} (± 27.6)	47.7 ^a (± 36.2)	20.2 ^b (± 22.5)	20.1 ^b (± 20.1)
% of cows with dirty back	34.5 ^{ab} (± 30.2)	43.2 ^a (± 28.5)	12.8 ^b (± 12.3)	19.6 ^b (± 19.2)
% of cows with dirty udder	27.5 ^{ab} (± 26.7)	36.6 ^a (± 26.6)	11.7 ^b (± 19.5)	21.9 ^{ab} (± 22.4)
% dystocia	20.6 ^{ab} (± 8.9)	28.9 ^a (± 12.9)	12.1 ^b (± 4.5)	17.3 ^b (± 6.2)

Animal Health

	TG-Ex (N=14)	BS-Ex (N=15)	TG-Int (N=15)	BS-Int (N=20)
Age at first calving	33.5 ^a (± 1.9)	32.9 ^a (± 2.9)	33.3 ^a (± 1.6)	30.8 ^b (± 1.8)
Calving interval	411.9 ^a (± 30.6)	489.7 ^b (± 78.7)	421.4 ^a (± 37.1)	436.1 ^a (± 33.6)
% of cows with FPQ<1 during first 100 d of lactation	21.3 ^a (± 11.3)	10.7 ^b (± 6.9)	22 ^a (± 12.8)	17.4 ^{ab} (± 9.3)
% of cows with cell count > 400000	6.7 ^{ab} (± 3.9)	12.7 ^a (± 7.1)	4.4 ^b (± 3.4)	9.2 ^b (± 7.6)
Number of lactations	3.2 ^a (± 0.5)	2.8 ^{ab} (± 0.6)	3.1 ^a (± 0.5)	2.6 ^b (± 0.42)

Economy

	TG-Ex (N=13)	BS-Ex (N=12)	TG-Int (N=14)	BS-Int (N=19)
Cost for concentrate/cow	358.6 ^a (± 176.7)	366.8 ^a (± 164.6)	815.2 ^b (± 253.1)	1027.1 ^c (± 249.2)
Cost for artificial insemination/cow	54.7 (± 14.5)	58.3 (± 15.2)	77.4 (± 50.7)	73.4 (± 33.6)
Cost for veterinary treatments/cow	43.5 ^a (± 48.7)	54.3 ^a (± 35.5)	93.6 ^{ab} (± 58.7)	109.8^b (± 64.1)
Subsidies/cow	837.4 (± 398.1)	621.6 (± 241.1)	771.1 (± 323.7)	525.3 (± 299.7)
Profit with subsidies/cow	1067.6 ^{ab} (± 729.7)	773.3 ^a (± 1028.8)	1726^b (± 522.9)	1320.8^{ab} (± 1034.8)
Profit without subsidies/cow	230 (± 672.2)	151.6 (± 973.6)	954.9 (± 641.1)	795.4 (± 1060)

Conclusion I

- **Animal husbandry:**
 - **Housing system:** loose housing most common in intensive BS
 - **Pasture:** extensive systems are more pasture based
- **Animal Welfare:**
 - BS in extensive systems show poorer animal welfare
- **Animal health:**
 - **Acidosis:** threshold for TG ?
 - **Mastitis:** more animals with cell count > 400,000 in extensive BS
 - **Number of lactations:** depending more on breed than on system (TG > BS)

Conclusion II

- **Economy:**
 - **Costs for veterinary treatments:** highest in intensive BS
 - **Subsidies:** possibility to compensate the lower yield of TG
 - **Profit with/without subsidies:**
 - highest in intensive TG systems
 - intensive systems are the most successful systems (milk : concentrate price = 2:1)
 - extensive systems depend more on subsidies than intensive systems
 - **Very high standard deviation for BS farms**
- **High variation in all systems: but the combination of a high yielding breed with an extensive system seems to be most challenging.**

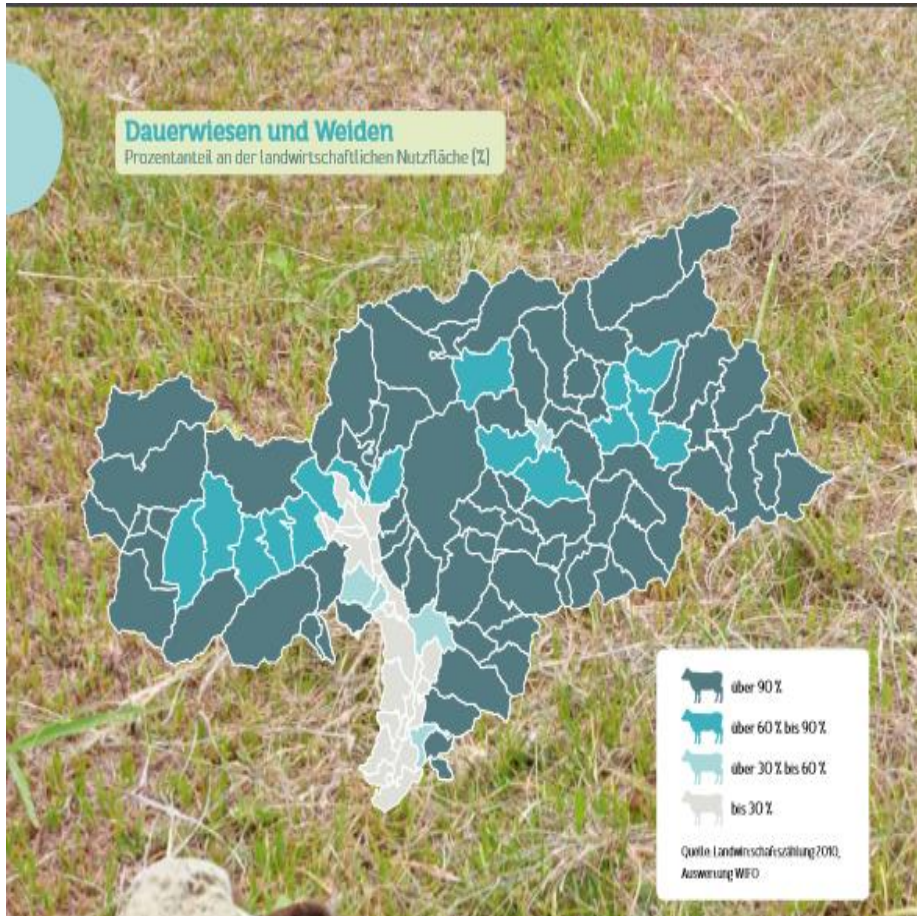


Thank you for
your attention!

References

- EFSA Panel on Animal Health and Animal Welfare (AHAW). (2015). Scientific Opinion on the assessment of dairy cow welfare in small-scale farming systems. *EFSA Journal*, 13(6), 4137
- Flint, L. et al., Thünen Working Paper 54
- Peratoner, G., Ros, G. D., Senoner, J. L., Figl, U., & Florian, C. (2017). Effect of slope and altitude on the costs of forage production in mountain areas. In *Grassland resources for extensive farming systems in marginal lands: major drivers and future scenarios. Proceedings of the 19th Symposium of the European Grassland Federation, Alghero, Italy, 7-10 May*
- Welfare Quality® (2009). Welfare Quality® assessment protocol for cattle. Welfare Quality® Consortium, Lelystad, Netherlands.

South Tyrol



Source: Agrar- und Forstbericht Südtirol 2015

Results – Social issues

	TG-E (N=13)	BS-E (N=12)	TG-I (N=14)	BS (N=19)
Balance workload-payment	4 ^{ab} (± 1)	4.6 ^a (± 0.67)	3.5 ^b (± 1.09)	3.7 ^{ab} (± 0.8)
10 years milk production	2.6 ^a (± 0.77)	2.6 ^a (± 0.79)	2 ^a (± 0.68)	1.8 ^a (± 0.99)
Satisfaction dairy industry	3.1 ^{ab} (± 1.49)	3.8 ^a (± 1.3)	2.5 ^b (± 0.78)	2.4 ^b (± 0.9)
Satisfaction milk yield/cow	3.2 ^a (± 0.38)	3 ^a (± 0)	3 ^a (± 0)	2.8 ^a (± 0.9)

Results – Social issues

- **Social:**
 - **Satisfaction:** lowest in extensive BS systems
 - **Working time:** similar work load/cow over all systems

In Progress

- Analysis of hay
- Ecology
 - Farm balance
 - Analysis of vegetation
- Tiny tags
- More breeds (Simmentaler)