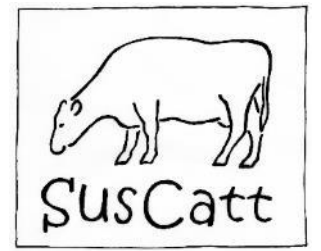




ERA-NET **SUSAN**



SusCatt - productivity, resource efficiency and product quality of forage and grazing based cattle production systems

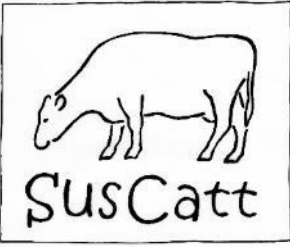
Håvard Steinshamn, Gillian Butler, Hannah Davis, Bjørn Egil Flø, Flaviana Gottardo, Anna Hessle, Matthias Koesling, Carsten Malisch, Elisabet Nadeau, Georgia Riuzzi, Tomasz Sakowski, Finn Walland & Anna Woodhouse



EUROPEAN RESEARCH AREA ON SUSTAINABLE ANIMAL PRODUCTION

The ERA-net Cofund SusAn is funded by European Union's Horizon 2020 Research and Innovation programme under grant agreement n° 696231

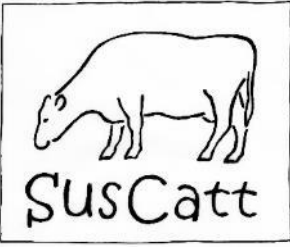




Productivity and Profits

- Bulls and steers from beef×dairy crosses had higher carcass weight and conformation score than animals from pure dairy breed, independent of diet (SE)
- Profit depended more on agri-environmental and support payments than choice of semen in dual purpose steer production (SE)
- Cross-breeding was more important for profit than plane of nutrition for bulls (SE)
- Performance in Italian beef and dairy production was not affected by replacing maize with other silages, hay and fresh-cut grass

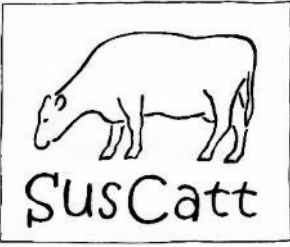




Productivity and Profits

- Dairy farms in Norway with high forage proportion in the diet had lower milk yield per cow but higher gross margins than farms feeding more concentrates
- Little difference in milk performance between dairy breeds and crosses in UK and PL. NZ Friesian had the best combination of positive traits (UK). High within herd variability on same diet
- Increase in pasture diversity increased milk yields (GE)

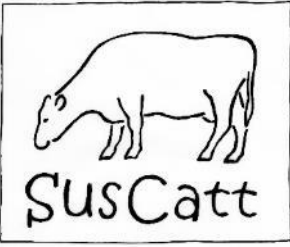




Environment and Resource use Efficiency

- Emission intensities from cows on pasture were generally much lower than previously reported, mainly due to high milk yield and herbage digestibility (GE)
- Pasture-based (GE), forage-based (NO) and ‘maize-free’, forage-based (IT) dairy systems seem to have a better environmental profile than conventional systems per kg of milk
- Pasture-based (GE), forage-based (NO) and maize-free , forage-based (IT) dairy systems seem to have less negative impact on biodiversity than the conventional systems, per kg of milk
- Beef produced on bulls in dual purpose systems have lower carbon footprint than steers, and beef crosses lower than pure dairy breeds (SE)

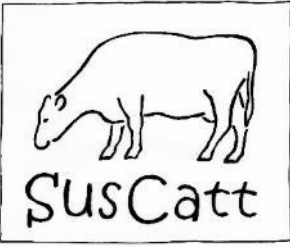




Society and Social sustainability

- Meat from beef × dairy steers had higher proportion of PUFA than pure bred dairy steers (SE)
- Meat and milk produced on high forage and ‘maize-free’, forage-based diet had higher proportion of PUFA and Ω -3 FA in the fat (IT, UK)
- Specialised beef breeds had poorer health status than local dual purpose breed (IT)

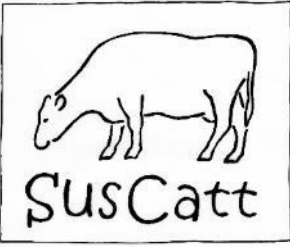




Society and Social sustainability

- Farmers milking once per day and/or predominantly pasture based management reported a significant improvement in health and well-being (UK)
- Considerable variation in antibiotic use, depending on breed and crosses (UK)
- Main reason for producing (farmers) and buying (consumers) grass-fed is that it is perceived by both groups to be better for the environment, animal health and welfare and climate (NO)



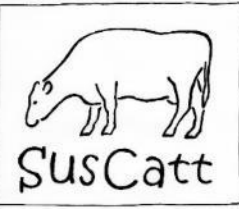


Future Research Needs

- Diet's impact on animal health and welfare
- Crossbreeding in dairy herds with heavy beef breed, production, meat quality and economics
- Effects of intensity within grazing based and systems based on preserved forages on production and environment
- Effects of sward diversity and grazing management on product quality, GHG emissions and carbon sequestration



Read our Technical notes on: <https://bit.ly/2GT10HF>



TECHNICAL NOTE



SusCatt - increasing productivity, resource efficiency and product quality to increase the economic competitiveness of forage and grazing based cattle production systems

Assessing diverse forages to reduce the environmental impact of grazing dairy cows

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About

Grazing dairy systems are the most cost-effective form of ruminant production, however, emit a large amount of methane. Methane production is a major source of agricultural greenhouse gases. We asked ourselves if diverse pastures, particularly when including tannin rich forages, could reduce methane emissions while maintaining productivity. Thus, we compared the performance and methane emissions of grazing dairy cows on two forage mixtures with contrasting sward diversity.

Challenge and objectives

Although the benefits of grazing dairy systems have been widely proven and customer preference for pasture-based milk and dairy products is increasing, information on methane emissions from cows grazing mixed swards, including tannin-rich herbs, is scarce. The existing information was that due to poorer feed efficiency, methane emissions per litre of milk increase if cows graze rather than being housed. On the other hand, several herbs have been hypothesized to reduce rumen methane production, while simultaneously providing ecosystem services - by enhancing carbon sequestration and biodiversity.

Our goal at CAU Kiel was to find out if we could create herb-rich, diverse pastures for intensively grazing dairy cows, that might combine all these benefits to produce environmentally friendly, high quality milk with lower methane emissions.



Jersey cow with CP4 equipment grazing on diverse pastures. Photo: Carsten Melisch

What did we do?

In the experiment, we measured enteric methane and milk yield from 24 mature, spring-calving Jersey cows grazing two perennial mixed swards with contrasting degree of diversity at peak (May) and late lactation (September). The swards were: (i) a relatively simple mixture of perennial ryegrass (*Lolium perenne*) and timothy (*Phleum pratense*), which also included white clover (*Trifolium repens*) and (ii) a diverse mix of perennial ryegrass (*Lolium perenne*), white clover (*Trifolium repens*), bird's-foot trefoil (*Lotus corniculatus*), salad burnet (*Stachys recta*), chicory (*Cichorium intybus*), narrow leaved plantain (*Plantago lanceolata*) and caraway (*Carum carvi*).

Throughout the study, cows were milked twice a day (0600 and 1600 h) and individual milk yield was recorded automatically, with subsamples analyzed for quality. Enteric methane collection was measured using the sulphur hexafluoride (SF₆) tracer technique, adapted

3.5.1

TECHNICAL NOTE



SusCatt - increasing productivity, resource efficiency and product quality to increase the economic competitiveness of forage and grazing based cattle production systems

Which cows suit UK low-input or organic dairying?

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Challenge

For years, breeding in mainstream dairying focused on increasing milk yield, but these high-performance cows do not suit low-input production. UK interest in low-input dairying has risen over the last 20 years, yet there is little guidance on breeding priorities, with individual farms customizing crossbreeding to suit their system. Here we describe lessons learned from 17 such farms.

Objective

In the absence of a coordinated approach to dairy breeding for low-input systems, each farm has largely been left to their own devices. Ideally, they want cows to maintain a reasonable yield of quality milk but they must reject cows back to cull, avoid mastitis and other ailments. Most farms use a combination of sire selection and culling (if it ever breeds and crosses, to speed up genetic improvement). This has been repeated up and down the country so, here we aim to coordinate the information from innovative farms, looking for common themes which might short cut the process for future practitioners. Another intention was to investigate the scope to enhance milk fat composition - aiming to breed cows that produce milk with more good omega-3 fats, which we talk in our diet.

What did we do and what did we find?

Seventeen herds were involved (7 organic and 10 low-input/conventional); all a mix of both purebred and crossbred cows, with the pedigree of each cow described by the farmers. Production, fertility and health records from



Typical crossbred cows. Photo by Adam Davy, Darlington, UK.

Just over 1000 cows were collected 4 times over a year. We also took individual milk samples each time, assessing fatty acid profiles, as well as basic composition including fat, protein and somatic cell counts.

In total we collected information on 40 different breeds and crosses; some in small numbers and maybe only on single farms. However, to generate guidance relevant for a range of systems, we restricted the comparison to records with at least six cows of the same breed (or combination), on at least three different farms - bringing the number of breeds down to 8 (listed in the table).

All individual assessments were then combined to give 2 overarching scores, for every cow recorded under these 8 breeds. These scores had different weightings to allow breed ranking under 2 differing priorities:

1. Health score: 30% production, 50% health and 20% fatty acids.
2. Production score: 60% production, 30% health and 10% fatty acids.

3.1.1

TECHNICAL NOTE



SusCatt - increasing productivity, resource efficiency and product quality to increase the economic competitiveness of forage and grazing based cattle production systems

Maize silage for beef cattle: good or bad? Health traits of dual-purpose crossbreeds and pure beef cattle

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About

Most meat produced in Italy comes from specialised intensive fattening farms in the Po Valley, importing young beef bulls and heifers from other EU countries. Cattle are fed high proportion of concentrates and diet are dominated by maize as silage, grain, trash and in other forms. Here we discuss the impact such diets have on the animal health of two beef breeds.

Challenge

Beef production in the Po Valley has been growing in recent decades thanks to the large-scale exploitation of maize, greater availability of imported European calves and an increasing market for beef in the Italian region, where demand is not met by local production.

However, new and increasing challenges for farmers to find alternative strategies to keep traditional agriculture alive; Italian beef consumption is falling while the demand for imported low-price meat is increasing. On the other hand, some meat consumers are prepared to pay more but are concerned about the environmental and ethical sustainability of the products they buy. Besides, historic European measures in favour of specialist beef farms have changed leaving farmers coming to terms with detrimental financial losses. As well as all this, agriculture needs to cope with climate change, which is especially challenging for maize production.

Objective

Animal feeding is one of the main concerns and the sector is searching for innovative strategies to maintain profitability from environmentally sound and ethical systems. We in-



Crossbred beef cattle reared on a SusCatt farm. Photo: Dr. Ruzzi Giorgia.

investigated if replacing maize silage with other forages enhances the animal health of contrasting beef breeds.

What did we do?

Ten beef farms in the Veneto region were involved, finishing cattle classed as either French meat breeds (FMB) or dual-purpose crossbreeds (C5B). To evaluate the impact of the diets on animals' health, two farm groups were created based on the proportion of maize silage in the diets: high maize silage (HMS; >25% of diet dry matter) and no maize silage (NMS).

Farms were visited 4 times in 12 months to assess animal health according to the Welfare Quality Assessment Protocol for cattle (2009), recording the incidence of lean or fat animals (based on Body Condition Score, BCS), lameness, coughs, nasal or ocular discharge, hunched posture, diarrhoea and bloated rumen. Subsequently, records were analysed to see how breed and diet, both individually and coupled, affected the animals' health status.

2.3.2

TECHNICAL NOTE



SusCatt - increasing productivity, resource efficiency and product quality to increase the economic competitiveness of forage and grazing based cattle production systems

Performance and carcass traits of beef-cross and pure bred dairy steers on forage and semi-natural pastures

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About

We are faced with a dilemma - grazing is necessary to maintain biodiversity in semi-natural pastures, but cattle contribute to climate change.

Could steers born into dairy herds offer grazers a lower climate opportunity, without compromising performance and carcass traits?

We compared the performance of beef-cross and pure-bred dairy steers in two forage and pasture-based production systems.

Objective

The effect of using beef semen on dairy cows has the greatest impact in intensive rearing systems where the genetic potential of crossbred cattle can be efficiently utilized. This study investigated if these crossbred steers also performed better than pure-bred dairy calves in extensive systems based on forages and grazing semi-natural pastures.

What did we do?

In the experiment, the performance of 32 pure-bred Swedish Red or Swedish Holstein dairy steers was compared with 32 Charolais steers from Swedish Red or Holstein dairy steers from two feeding levels. Sixteen calves from each group were fed at a moderately high intensity and these were compared with 16 from each group fed a lower intensity diet.

The high feed groups of spring-born calves started inside on early harvested grass/clover silage supplemented with barley, peas and rapeseed meal, initially composing 42% of diet. Concentrate decreased along with increased



The steers were reared at SLU Gotland Beef and Lamb Research Centre. Photo: Anna Hestle.

animal weight to 0% at turn-out to semi-natural pastures. Steers finally were finished inside on early harvested silage, for slaughter at 21 months of age.

The low intensity autumn-born calves had a shorter initial housing period followed by grazing semi-natural pastures after turnout. During winter housing, they ate late cut silage and were housed for final finishing on early cut silage and slaughtered at 28 months of age.

They were followed throughout life, to slaughter and cutting, weighing sections from one hindquarter of each animal.

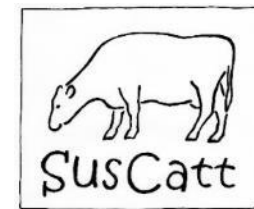
Compare right weight gain

Growth rates for the cross bred and pure bred calves throughout life were similar at 0.65 kg per day. However, after slaughter we could confirm the superiority of the crossbreeds with greater carcass weights. For steers slaughtered at 21 months of age, their carcasses were on average 32 kg higher compared to pure-bred dairy steers. For steers slaughtered at 28

2.1.1



The SusCatt management group thank you for your attention



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Steinshamn



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Flaviana
Gottardo



Anna
Woodhouse



Gillian Butler



Carsten Malisch



Tomasz
Sakowski



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