A pilot socio-economic analysis of QLIF dairy projects

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Abstract

A pilot socio-economic impact assessment was carried out on three dairy projects within QLIF to identify the business, consumer and policy issues likely to influence the adoption of the innovations resulting from QLIF. A socio-economic analysis is presented related to the key outcomes from the three projects which include: management systems to reduce mastitis and antibiotic use in organic dairy farms and how milk quality can be enhanced through high forage organic feeding systems. Due to a lack financial data costs had to be assumed based on other studies. The socio-economic analysis identified a significant number of potential economic and social implications of implementing strategies developed in the QLIF project that aim at increasing animal health welfare and milk quality.

Introduction

The integrated project QualityLowInputFood (QLIF) aims to improve quality and ensure safety and reduce cost along the European organic and "low input" food supply chains. Innovations developed within the project will have impacts on businesses operating within organic and "low-input" supply chains as well as on broader social and policy issues. Impact, assessment focused on dairy related WPs 2.1, 4.5.1 and 4.5.2 which had identified methods to improve milk quality and animal health and welfare. While these innovations are of relevance in their own right, they also need to be justified in terms of the financial impacts on businesses as well as the broader socio-economic impacts as these issues are likely to influence their adoption.

Methods

The socio-economic impact assessment of the three selected dairy projects (details in Table 1) is intended to cover primarily economic aspects (value of non-market cost/benefits; financial returns/profitability; risk; producer/consumer welfare; public expenditure), but also social aspects (employment, labour incomes, working conditions, health & safety, culture/recreation, consumer incomes/affordability), policy/ institutional implications and multi-functionality/sustainability issues. Quantitative analyses were only carried out where sufficient data was available and/or where costs could be estimated based on available data from previous dairy studies. Analyses are mainly based on physical data (supplemented with some financial data) supplied by the dairy project teams. The results of the analysis are presented in Table 1.

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Tab. 1: Summary of socio-economic analysis of three dairy related projects within QLIF

	1: Effect of dairy management on quality of milk	2: Effect of farm practices on udder health and milk quality	3: Suckling systems for organic calf rearing
Title			
Objective	Compare milk quality and cow health in organic, low-input and conventional systems with different feeding regimes in five countries.	Identify factors influencing udder health in CH organic dairy farms; identify therapeutic and preventive measures to avoid antibiotics in mastitis control	Impacts of alternative calf rearing systems: bucket fed (milk replacer or whole milk) and suckling (maternal suckling then nurse cow or nurse cow only)
Main outcomes	▪ Proportion of grass or grass/clover forage higher in UK[5] than in IT, DK, SE ▪ Maize silage and concentrate feeds major diet components in IT, DK, SE ▪ Proportion of forage in organic diets higher in all countries ▪ Organic milk tended to have higher α-linoleic acid, conjugated linoleic acid and vaccenic acid levels and higher levels of fat soluble antioxidants (Vitamin E and carotenoids) ▪ SCC higher on organic ▪ No. of mastitis and other veterinary treatments higher on conventional	▪ Factors significantly affecting SCC are breed, alpine summer pasturing, calf milk feeding strategy, hard bedding and no post-milking procedure. ▪ Advisory intervention did not reduce average herd SCC in the first year. ▪ Herds with moderate udder health pre-drying off can avoid any treatment. ▪ Use homeopathy as therapeutic measure against sub-clinical mastitis in herds with SCC<200k/ml at drying off. ▪ Use teat sealants where increased risk from environmental pathogens and cows have SCC<200k/ml at drying off.	▪ Consumption of maternal or nurse cow milk lead to higher weaning weights at 3 months of age ▪ No immediate health problems linked to suckling systems ▪ Increased natural behaviour (e.g. cow-calf bonding) in suckling systems ▪ Loss of marketable milk in suckling systems compared to bucket fed ▪ Increased stress after weaning in maternal single suckling systems - farmers changed to nurse cow only or maternal single suckling followed by nurse cow systems
Wider impacts	+ Consumer: nutritionally enhanced milk + Animal welfare: forage a natural feed 0 Adoption: reflects current practice - Processor: oxidation and off flavours - Environment: may be higher methane losses from high forage diets	+ Processor: lower SCC milk + Consumer: reduced antibiotics +/- Adoption: reduced inputs but requires system changes + Animal welfare: reduced mastitis + Environment: reduced heavy metals from teat sealants	+ Consumer: integrity of organic product + Animal welfare: mother/calf bonding + Technical: improved growth rates 0 Environmental: no impacts identified 0 Processor: no impacts identified

[5] CH: Switzerland; DK: Denmark; IT: Italy; SE: Sweden; UK: United Kingdom

Financial cost-benefit assessment

COSTS 3,075 € per year for 100 cows

Value of yield loss due to higher SCC[6]

Replacement rate	O:20%[7]; C:30%
SCC	O:251, C:209 kcells/ml
Net yield loss (O-C)[8]	0.23 kg/cow/day
Annual cost for 100 cows	2400 €

Milk price penalty due to higher SCC

Organic yield (305d@22.2)	6771 kg/cow
Price penalty	0.001 €/kg
Annual cost for 100 cows	675 €

BENEFITS 52,760 € per year/100 cows

Veterinary cost decrease[9]

Vet. Costs[9]	O:35, C65 €/cow
Annual saving for 100 cows	€3000

Feed cost decrease less yield difference

Milk yields	O:22.43, C:27.7 kg/cow/day
Concentrate use	O:5.5, C:10 kg/cow/day
Conserved forage	O:0.36, C:0.35 kg/c/d
Grazed forage	O:5.5, C1.5 kg/cow/day
Annual saving for 100 cows	2,360 €

Value of organic milk

Organic milk premium	0.07€/kg
Annual benefit for 100 cows	47,400 €

NET BENEFIT of organic production 49,700 € per year for 100 cows

COSTS not estimated

Cost of system changes

Difficult to quantify costs of short and long term systems changes as very specific to the individual farm – higher costs associated with long terms changes (e.g. changes to breed, alpine pasturing and housing).

Costs of inputs

Cost of homeopathic and teat sealant treatments are small but also no significant impact on post parturition mastitis.

BENEFITS from mastitis control best practice on organic farms 23,000 € per year/100 cows

Milk yield increase from best practice

Top performing farms with best practice in 4 or 5 of key system mastitis factors: 22.3 kg/cow/day; other farms 20.4 kg

Annual benefit for 100 cows	22,300 €

Milk quality gain due to improved SCC

Price penalty reduction	0.001 €/kg
Annual benefit for 100 cows	700 €

COSTS of suckler system if saleable organic milk 105-185 €/calf

Cost of organic milk consumed

Milk price	O:0.35; replacer: 0.40 €/kg
Consumption bucket reared	540 kg/calf
Value of tank milk:	189 €/calf
Cost of organic milk replacer	216 €/calf
Consumption nurse cow	840kg/calf
Value of organic milk	294 €/calf
Consumption maternal suckling (1m) and nurse cow (2m)	1065 kg/calf
Value of organic milk	373 €/calf

'Unmarketable' milk from cull cows (not high SCC/antibiotic) prod. Cost 0.25 €/kg

Cost of nurse cow system	210 €/calf

Cost of other feeds no data

BENEFITS suckler LW gain 70 €/calf

Live weight gain (kg/calf at 90/365 days)

Maternal/nurse cow suckling	136/343 kg
Tank milk bucket fed	101/316 kg
Milk replacer bucket fed	95/288 kg
Value of extra LW (2 €/kg)	70/54 €/calf

Other benefits

More research required to quantify long term health, longevity and productivity benefits of live weight differences.

[6] Abbreviations: SCC: Somatic cell count; O: organic; C: conventional; LW:
[7] Lampkin et al. (2006)
[8] Based on calculations by Reneau (1986) using the relationship between SCC and yield loss
[9] Costs derived from Jackson and Lampkin (2006), but proportions similar to treatment differences identified in this study.

Discussion

Developing strategies to improve milk quality and reduce antibiotic use are the cross cutting themes in these three dairy projects.

In the first project, systems which fed high forage diets resulted in milk with enhanced fatty acid and antioxidant profiles. The financial analysis of these systems shows reduced concentrate feed and veterinary costs, but also decreased milk yield per cow and increased somatic cell count (SCC), which largely balanced each other out. However, the net benefit of the high forage diet systems was substantially increased by the organic premium reflecting in part the value placed by consumers on the enhanced nutritional quality of the milk.

In the second project, management factors were identified as significantly influencing somatic cell counts in Swiss dairy herds. Some factors can be changed in the short term (e.g. post-milking management), but other factors are longer term strategies that are likely to be more costly (e.g. changing bedding system, breed, summer feeding system). It is difficult to put a cost on such changes as they are specific to individual farm systems. Dry cow therapies were found to be unnecessary in herds with moderate udder health resulting in saved veterinary costs (for homeopathy, teat sealant and/or antibiotics) without significant milk losses.

In the third project, using maternal single suckling and nurse cows to suckle calves, although costing more than bucket rearing, resulted in calves with higher weights at weaning and one year old. However, more milk was fed per kg liveweight gain, and the value of the milk used exceeded the financial benefit of the gain. Further work is required to assess the impact of these rearing systems on first lactation performance, longevity and mastitis levels, as well as the impact on intakes of other feeds.

Conclusions

In addition to the project results themselves, the analysis undertaken has identified significant associated economic impacts and highlighted where social impacts may also occur. The methodology is limited to some extent as some of the assessed work packages are as yet incomplete. Due to a lack of direct financial data, in many instances costs have had to be assumed based on other studies.

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