Dutch Dairies Reward Grazing

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Abstract. Changing societal drivers and consumer demands require systems that provide desired human foods produced through sustainable production systems. The aim was to show effects of grazing system on milk fatty acid (FA) composition in Dutch farming practice and to analyse current developments in grassland utilization and dairy payments. Milk conjugated linoleic acid (CLA) concentration was a function of hours cows spent at pasture, both at a regional and at a farm scale. Despite beneficial effects of fresh herbage in the dairy production chain on unsaturated FA in milk, the trend in The Netherlands is that cows are more indoors and consume less fresh grass. Action groups have triggered the public debate, mainly from the viewpoint of animal welfare. This has provoked much discussion and raised concern in the public opinion and in politics. Sentiments and marketing rather than scientific evidence dictated the political agenda. In 2011, retailers replaced their private label dairy products with certified products based on milk from farms where cows have access to pasture. The major Dutch dairy company changed its policy in favour of promoting grazing, mainly to preserve the natural image and for providing dairy farmers a societal license to produce. Farmers who graze cows get a premium of €0.50/100 kg milk since 2012.

Keywords: Dairy production chain, grazing milk, market, pasture milk, public opinion, retail.

Introduction

Changing societal drivers (*e.g.* landscape values, animal welfare) and consumer demands (*e.g.* tasty/healthy products) require systems that provide desired human foods produced through sustainable production processes. High-fat human diets, especially those rich in saturated fats, are often claimed to have detrimental effects on cardiovascular disease risk factors such as blood low density lipoprotein cholesterol. Dairy products contribute 15-20% of human intake of total fat, 25-33% of saturated fat and about 15% of dietary cholesterol.

During the last few decades, the composition of milk has changed due to animal breeding, cow's diet and farm management. In The Netherlands, the milk production per cow greatly increased, as did fat and protein contents. The fatty acid (FA) composition of milk has in many countries become less favourable from a human nutrition viewpoint, as unsaturated FA concentrations have declined (Elgersma *et al.* 2006a,b). This is due to an increased demand for energy in cows, and changed feeding and management practices, notably higher proportions of concentrates and silages in diets with less grazing. The trend that cows are kept more indoors has raised public concern.

Economic analyses have shown benefits of grazing, as conserved feed is more expensive than fresh herbage. For similar climatic conditions, grazing is more economically attractive than indoor feeding systems (Peyraud *et al.* 2010). The more grass cows eat at pasture, the larger is the farmer's income (Van den Pol-van Dasselaar *et al.* 2010). However, cows with very high milk yield potential cannot meet their energy requirements from grass alone, partly due to insufficient intake. Another bottleneck with very large herds often is the distance of paddocks to the milking parlour, particularly with farms using a milking robot. Grasslands however could offer considerable scope to help create dairy product differentiation in increasingly competitive markets. The aim of our studies was to raise awareness for regional and temporal changes in milk FA composition in relation to cow diet, grazing system and hours at pasture. Current developments and implications for farmers, dairies and consumers will be discussed.

Methods

In a first experiment, pooled farm tank milk samples were analysed monthly; concentrations of CLA that were presented earlier as pooled data (Elgersma *et al.* 2006b) were assessed separately for each of four regions of The Netherlands. In a second experiment, CLA concentrations were measured in milk samples of individual farmers. Questionnaires provided associated information on soil type, feeding system and hours that cows spent at pasture at the time of sampling. CLA content was compared among groups of farms with different grazing systems (day and night versus only daytime at pasture) and with indoor system. Finally, temporal and regional trends in grazing systems were analysed using statistical data (Source: www.cbs.nl).

Results

Experiment 1, regionally pooled tank milk

CLA concentrations in pooled tank milk from the West and North of The Netherlands were higher than in the South and East, particularly in the grass growing season (mid April – late October) (Fig. 1). September 2001 had unusually wet and cold weather and October 2001 was dryer with higher temperatures. Various farmers temporarily turned in their cows in September and turned them out again in October. This probably caused the lower

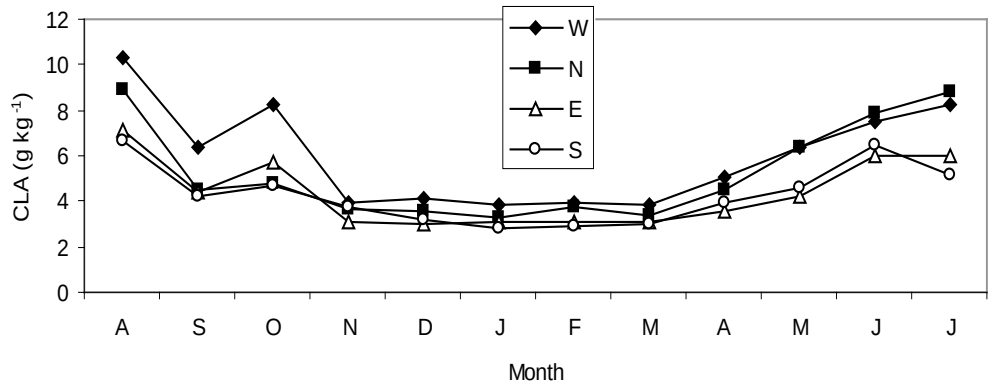

Figure 1. Concentrations of conjugated linoleic acid (CLA) in pooled farm tank milk of 4 regions (West, North, East and South) in The Netherlands from August 2001 till July 2002. (Modified from earlier presented national data (Elgersma *et al.* 2006b)).

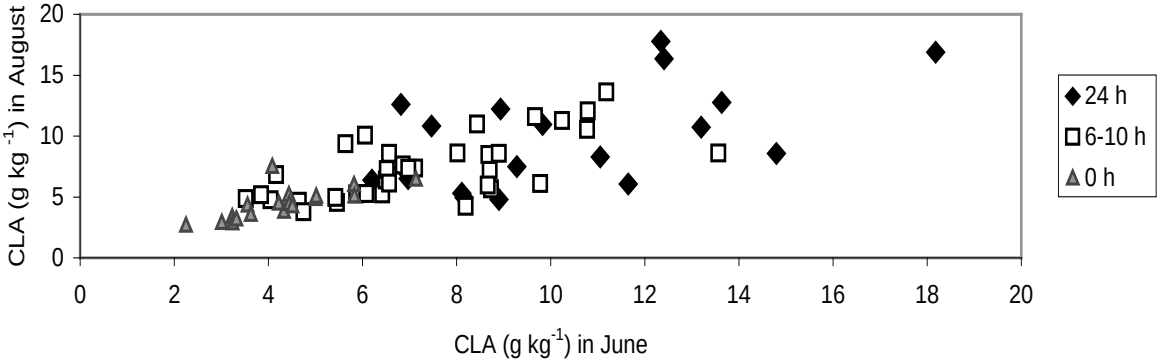

Figure 2. Concentrations of conjugated linoleic acid (CLA) in farm tank milk in June and August 2007 in the Northern Dutch region of 73 farms practicing day and night grazing (♦), daytime grazing (□) or indoor feeding (▲) without fresh grass; cows being 24, 6-10 and 0 h at pasture, respectively.

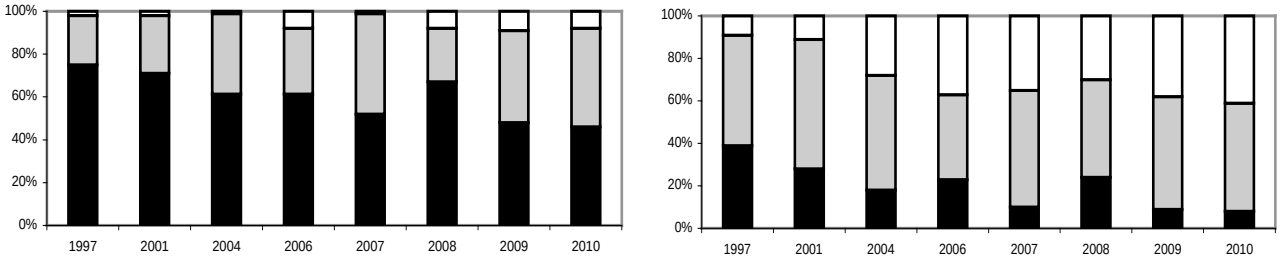

Figure 3. Regional changes in Dutch grazing systems since 1997 in the West (left) and South (right) showing % of cows day and night at pasture (black), daytime at pasture (grey), always indoor (white).

milk CLA concentrations in September relative to October 2001 (Fig. 1).

Experiment 2, individual farmers' tank milk

Large variation in milk CLA concentration was found among individual farms, but clearly in relation to feeding system: farmers with summer feeding (*i.e.* year-round silage and concentrates, without fresh grass) had the lowest, and farmers whose cows had day and night access to pasture had the highest CLA concentrations in their milk. Restricted stocking (*i.e.* daytime grazing and indoors at night) resulted in intermediate levels (Fig. 2).

Changes in Dutch grazing systems in different regions

The Netherlands are a small country in NW Europe with a land area of 3.3 x 10^6 ha including ca. 1 x 10^6 ha grasslands, mainly with perennial ryegrass. In the North and West, the country borders the North Sea and the climate is maritime with mild winters due to the gulf stream. With a population of 16 x 10^6 which mainly live in the West, average population density (491/km^2) is among the highest in the world. Circa 1.5 x 10^6 dairy cows are kept on 19,000 dairy farms. Most farms are family farms with on average 76 dairy cows. Half of the farms keep 50-100 cows and 23% have >100 cows. The average milk production per cow is just over 8,000 kg / year, with 4.4 % fat and 3.5 % protein (Source: www.prodzuivel.nl; data for 2011). The Netherlands are a leading dairy country with an efficient dairy farming sector and industry and well-developed infrastructure. Value-added products like cheese are of key importance.

Cow numbers at pasture have declined since 1997 up to the present. While 48% of the Dutch cows were day and night at pasture, 45% only daytime and 8% never in 1997, 2011 estimates are 17, 53 and 30%, respectively. However, large regional differences occur as is depicted for the West and South regions in Figure 3.

Most grazing cows were, and are, found in the West of The Netherlands, where soils mainly consist of clay and peat, with high water tables and largely unsuitable for arable cropping. Traditional land use is grassland and cheeses like 'Gouda' and 'Edam' originate there. Although the percentage of cows that are always kept indoors has increased since 1997 (Fig. 3), in the West it is much lower than in other regions. In the South, with prevailing sandy soils, the proportion of cows that are always kept indoors are higher than in other regions. Already in 1997, 9% of the cows were kept indoor (Fig. 3) and for 2011 this is estimated at 46%. In the North and East (not shown), intermediate patterns are found. In general, indoor feeding (with no grazing and no fresh grass in the diet) increases, while day and night grazing is being replaced by daytime grazing.

Discussion

Milk fatty acid composition in relation to diet

Milk from cows fed fresh green forage, especially in grazing systems, has much higher unsaturated FA concentrations than milk from silage-fed cows (reviewed by Elgersma *et al.* 2006b). Therefore, in farming systems where fresh herbage is fed CLA concentrations show seasonal fluctuation, with lower levels during the indoor season than during the grass growing season. In summer feeding systems, milk CLA concentration is constantly low.

This study showed that in 2001, CLA concentrations in pooled tank milk from the West and North of The Netherlands where cows are fed mainly grass and soils consist mainly of clay and peat, were higher than in the South and East, where sandy soils prevail and much maize is cultivated and fed year round. The average CLA content in milk from June to August ranged between 6.1 g/kg in the South and 8.7 g/kg in the West (Fig. 1). In the 1960's, during summer the Dutch farm milk contained, on average, 15 g/kg conjugated linoleic acid (CLA) from May to Oct (Elgersma *et al.* 2006b).

In 2007, the examined farms with unrestricted grazing had summer milk CLA concentrations ranging between 5 and 18 g/kg (Fig. 2); their average across both sampling dates in June and August was 10.0 g/kg. Means for daytime grazing and summer feeding were 7.1 and 4.4 g/kg. In the 1960s, day and night grazing was the commonly used grazing system. Despite similar pasture access, the examined 19 farms with day and night grazing still had a lower CLA content than in the 1960s (10 versus 15 g/kg). This is due to the fact that cows nowadays have a much higher milk yield potential due to animal breeding and are fed more concentrates than in the 1960s. Grass varieties have changed as has grassland management, therefore actual grass intake could be different despite a similar daily grazing time. At a national level, there is a greater share of milk from (large) farms with summer feeding systems. Besides, some farmers turn out their cows later in spring and there is a trend for more maize silage feeding. When cows have daytime access to pasture but have a large proportion of silage and concentrates in their diet during the night, grass intake is lower than in systems largely based on grazed grass. At present, the largest contrast in grazing is found between the West and the South (Fig. 3). In the South and East, more maize silage is fed and during summer, less grazing is practiced. Farms with automated milking systems and large herds have more problems with grazing and grazing management. Advantages and disadvantages of grazing are perceived differently by different farmers, and depend on region and country (Van den Pol-van Dasselaar *et al.* 2008).

Trends and developments in The Netherlands

The most highly productive grassland in Europe is in the Atlantic region: Netherlands, western Belgium, western France, north-western Spain, Ireland, Wales, England and northern Germany. This is also the area with the highest density of milk production. It is forecasted that with the abolition of EU milk quotas milk production in these regions will continue to increase while declining in the remainder of Europe (Dillon 2013). In recent years Europe's agri-food industries have been re-shaped by international/internal policy changes combined with a range of growing public concerns, including climate change, environmental sustainability, food safety and security and animal health and welfare. Research has shown benefits of grazing in terms of improving milk FA composition (*e.g.* Elgersma *et al.* 2006a,b) and economics (Van den Pol-van Dasselaar *et al.* 2010) as well as ecological farm performance (Peyraud *et al.* 2010). Milk prices received by Dutch farmers fluctuated strongly during the past years; in 2007 the average price peaked to €37.5 for 100 kg milk, 2008 it was €33.6 but in April 2009 the price dropped dramatically to €24.4 followed by a gradual increase to €34.4 in 2010 (Source: www.prodzuivel.nl). Grazed grass is cheaper than ensiled feed, but milk price fluctuations only partly coincided with changes in grazing system: in 2007 with high milk prices cows were less day and night at pasture and more only daytime grazing, while in 2008 when milk prices declined cows were relatively more day and night at pasture (Fig. 3). However, in 2009 with the low milk prices, the grazing situation was similar to that in 2007 with the high prices. Variation in weather conditions and grass growth probably played a more important role for the farmers' decisions regarding grazing time.

In The Netherlands, despite much research data, it was not scientific reason and facts but sentiments that dictated the political agenda. The Dutch consider cows on grassland as their cultural heritage and associate grazing with landscape values, naturalness and being good for the animals. While pigs and poultry are kept indoors and are associated with bio industry and odours, cows have a positive image. The fact that more cows are kept indoors was highlighted by action groups (*e.g.* 'Wakker Dier') who triggered the public debate, mainly from the viewpoint of animal welfare. This has provoked much discussion and raised concern in the public opinion and in politics. Retailers changed their policy and decided to replace their private label dairy products with pasture based milk from April 2011 onward.

In September 2011, the major Dutch dairy cooperation (Friesland Campina) changed its policy in favour of promoting grazing, mainly to preserve the natural image and for providing dairy farmers a societal license to produce. From 2012 onward they pay a premium price (€0.50/100 kg) only to farmers who have their cows on pasture at least 120 days/year for minimal 6 h/day. In this way, primary producers who practice grazing can benefit from the higher market value at the end of the production chain. Grazing practices are discussed among farmers. Consumers can recognize products based on milk from pastured cows by a new logo ('Weidemelk' – translated as 'pasture milk').

Conclusions

Milk and dairy products from grass-fed cows contain more unsaturated fatty acids. Regional variation in The Netherlands in farm milk CLA concentration was linked to feeding systems. Grazing is most practiced on peat and clay soils in the Western region, where milk CLA contents are highest. Most Dutch cows are still on pasture but regional differences occur and the trend is for more indoor feeding. Results have been used by action groups to trigger the debate; they provoked much discussion, also on animal welfare, and this raised concern in the public opinion and in politics. Besides facts, sentiments in the media dictated the political agenda. Retail played a very important role. Dairy cooperatives made a switch in favour of promoting milk produced from cows grazed on pasture and since 2012 have rewarded farmers by paying them a premium (€ 0.50/100 kg milk)for the milk produced in this way

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