McDonald's Europe Flagship Farms

Dairy – FrieslandCampina, Haanmeer 3, Koudum, Holland

Modern facilities and high standards of animal welfare provide dairy cows with optimal conditions.

This case study shows how dairy production can be undertaken in a manner which maximises the welfare conditions of the cows, whilst reducing the impact on the environment.

Here we highlight good practice in animal and employee welfare, species conservation and in reducing pollutant gas emissions.

The McDonald's Flagship Farms scheme has been developed in co-operation with the Food Animal Initiative to showcase good agricultural practices which are environmentally sound, economically valuable and ethically acceptable. A limited number of 'flagship' farms have been selected from within the McDonald's supply chain to represent progressive agricultural practice.

The following matrix has been developed by McDonald's to help assess sustainability within the agricultural supply chain. Farms selected demonstrate good practice in at least one of the matrix key areas, whilst also operating to generally high standards in all other areas.

Symbols EN EC ET are used to highlight good practice in environmental, economical and ethical issues.

✓ Good practices demonstrated in this case study

McDonald's Good Practice Matrix

Ethical (acceptable practices) ET

Human health & welfare ✓
- i Employee health & welfare ✓
- ii Food safety ✓

Animal health & welfare ✓
- i Nutrition
- ii Medication & growth promoters
- iii Genetic selection
- iv Animal cloning
- v Husbandry
- vi Transport ✓
- vii Slaughter

Business ethics & supplier relationships

Rural landscape preservation

Environment (protecting the planet) EN

Climate change
- i Greenhouse gas emissions
- ii Energy efficiency & renewables

Natural resources – soil
- i Soil fertility & health
- ii Soil erosion, desertification & salinisation
- iii Soil contamination

Natural resources – water
- i Water pollution
- ii Water usage efficiency

Natural resources – air ✓
- i Air emissions ✓

Agrotechnology
- i Agrochemical usage
- ii Bioconcentration & persistent organic pollutants
- iii Genetically modified organisms

Ecosystem protection ✓
- i High conservation Value Land (HCVL)
- ii Habitat & species preservation ✓

Waste
- i Production waste
- ii Hazardous waste
- iii Waste to landfill

Economics (long-term economic viability) EC

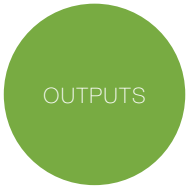
Sufficient high quality production ✓
- i Producer income security & access to market
- ii Agricultural input costs ✓
- iii Crop & livestock disease

Community investment
- i Local employment & sourcing
- ii Support for community programmes

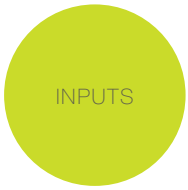
Executive summary

Key areas of good practice:

With the introduction of robotic milking (over 10 years ago) milk yields have increased and it allows the cows “Free Choice” as to when they are milked. As for staff, repetitive strain injury is eliminated through not having to milk 14 times per week and by being released from this routine allows increased social/family time.



The grooved anti-slip floor reduces emission of ammonia from the slurry and with hourly cleaning/removal can give a reduction in ammonia emissions of 30%. The grooved anti-slip flooring gives improved cow comfort which allows the cows to show natural behaviour.



Dual chamber water beds improve cow comfort and reduce injuries such as swollen hocks/lesions. Research shows that cows need to lie down for 10 to 12 hours per day (Albright, 2003) so this comfortable lying environment is of paramount importance. Another important aspect of the water bed is that it reduces the quantity of bedding required per cow and remains cleaner than other bedding types.

Additional areas of good practice:

The farm is a member of the Qarant farm assurance scheme which covers key aspects such as food safety, animal health and welfare. Being independently inspected means that retailers and consumers are assured that these high standards are being met.

Weekly foot-bathing and tri-annual professional foot trimming ensures that hoof care is at the forefront of animal care. This has reduced the incidence of lameness to extremely low levels, which is a major health and welfare benefit for the cows.

An outdoor loafing area for cows during the summer period allows cows a “free choice” on access to the outside.

15 hectares of “Nature fields” are available for migrating wild geese to graze over the winter period, providing an important food source for these migrating birds.

Summary of actions and benefits

	Action	Benefits		
		Environment EN	Economics EC	Ethics ET
Staff	Robotic milking			Reduces repetitive strain injuries for staff and allows more social and family time
Management	Member of the Qarant Milk Quality Assurance scheme All eggs are produced under the RSPCA's Freedom Foods Standards		Allows milk to be more easily marketed	Covers aspects of animal welfare and provides confidence to retailers/ consumers that production methods are independently checked
Inputs	Built a new 240 place dairy building	Slat design limits ammonia emissions	Once quotas are phased out herd numbers can be rapidly increased	Increased cow comfort and welfare
	Dual-chamber water beds		Reduced bedding costs	Improved cow comfort and welfare
Operations	Heifer calves sold to a specialist rearing unit		Allows the farm to focus on its core business – milk and grass production	
	Robotic milking		Increased milk yields	Allows cows to be milked at a more natural frequency, 2-5 times per day
	Weekly foot-bathing with tri-annual foot check		Good foot care leads to improved cow performance	Reduced incidence of painful hoof conditions
	Auto-scrape every hour			Quicker slurry removal from under foot
Resources	15 hectares of natural grassland	Wild geese allowed to graze this area over the winter period		
Outputs	Outdoor loafing area provided			Cows have free access to outside during summer
	Grooved floor design in housing	Reduced ammonia emissions from slurry		

Introduction

The Netherlands covers an area of 3.5 million hectares and is one of the smallest and most densely populated countries in the world, and one of the largest exporters of agricultural products. The country has always been at the forefront of development and application of new agricultural techniques, and has made good use of its available resources.

Of the 3.5 million hectares in Holland around 1.9 million hectares is farmland. Just under half of the farmland is pasture devoted almost entirely to dairy farming and in addition to this, approximately 300,000 hectares of arable land are used for the production of feed crops for cattle (of which 230,000 hectares are for fodder maize etc). Dairy farming in the Netherlands occurs in diverse conditions and on various soil types, with the mean annual rainfall being more than 700 millimetres.

There are 21,000 dairy farms which together have a dairy herd of 1.4 million and a total milk quota of 11 thousand million kg. One third of the dairy farms are responsible for two thirds of the milk produced. More than 80% of the dairy farms are specialist farms and on average, these have about 60 dairy cows, a milk quota of 525,000 kilograms and 30 hectares under cultivation. The farm work is carried out by about 1.6 full-time workers, usually including the farmer and one or more family members. Dairy farming, including milk delivery and processing, provides almost 160,000 working years employment and has an annual gross turnover of 6.35 billion Euros. (Source: Agricultural Office of the Netherlands Embassy, 1998. Eurostat, Farm structure in Netherlands 115/2008)

Anton Stokman's parents purchased this dairy unit in Friesland in 1964. Anton grew up on the farm and took over the running of the unit in 1985. Anton's vision for the farm was to increase the number of milking cows, and over the following 10 years he expanded the herd to 120 cows, and purchased two Lely robotic milkers in 1998. During this time period water beds were installed in the cubicles with the aim to improve cow comfort.

A new, purpose built 240-cow place dairy facility has been constructed and the cows have just moved into this modern accommodation (as of February 2009). Although there are currently only 140 cows in the herd, the benefit of building this larger capacity shed will enable rapid expansion once quotas are phased out (in 2015). The new building consists of many of the long-standing good practices (robotic milking and water beds) and this project has enabled other new developments to be included in the facility including the philosophy of "Free Choice" for the cow still stands. The herd are Holstein cows which calve all year round, ensuring a constant supply of milk to the local processor.

Staff

The biggest burden on labour of any dairy farm is tied up in the routine (2 or 3 times per day) of milking cows. Depending on the number of cows and the type/size of the parlour, a single milking session can take 2-3 hours (4-9 hours daily). With spending such a large amount of time undertaking the same routine every day, repetitive strain injury (RSI) is a real hazard for all staff involved. The milking routine is also a 7 day a week, 365 days a year routine. This impacts on the free-time and social life of staff, also making it difficult to retain/employ the high quality staff needed to run a successful dairy unit.

With the introduction of two Lely Robotic milking machine 11 years ago (which have now been replaced by four new Lely Milking machines in the new dairy facility), the whole milking operation is fully automated, leaving staff more time to monitor the cows and freeing them from this time-consuming task.

"From research conducted by the Animal Science Group of Wageningen UR into the health issue for milkers, it has become clear that the risk of injuries is lower for users of automatic milking systems. In addition to this, researchers of the Swedish Agricultural University of Uppsala have reported that the use of a milking robot greatly reduces the risk of injuries through overburdening. The university researchers have conducted their study at eight dairy farms. Four of these farms had a tandem type milking parlour, whereas on the four remaining farms a milking robot had been installed. The conclusion of the research was: on dairy farms with a milking robot, the risk of injuries sustained by the dairy farmer was 7 to 12 times lower."

(Source: Lely Concept of Robotic Milking)

This reduction in time spent waiting to be milked and being milked, benefits the cows and allows them more time to socialise, eat and rest. Cows require 10-12 hours of lying/resting time which can take preference over feeding if time is restricted (Metz 1985). High lactation dairy cows must be able to eat whenever they require as this provides nutrition for optimal cow health/ welfare and productivity, which improves farm economics. With increased time spent feeding, improved milk yield can be achieved (Shabi et al. 2005).Therefore performance and farm economics may be improved if the dairy cow has this extra time to feed. The whole ethos of robotic milking also readily feeds into the concept of a 'Free Choice' system for the cows, as they can decide when they want to be milked, feed and rest.

ET

EC

The introduction of automatic milking machines has improved employee welfare, provided cows with 'free choice' and improved behavioural conditions, while also increasing yield.

Management

The farm has joined the Qarant Farm Assurance Scheme, which was initially set up by Royal Friesland Foods (a Dutch dairy processing co-operative) in response to European regulations (EU regulation 178-2002, the General Food Law). This quality assurance programme starts at dairy farm level and deals with the milking process, storage of milk, animal health/ welfare, medications, feed and water, milk quality, administration and registration. These areas deliver high food safety, animal health and welfare, and have been developed to take account of the demands of consumers and retailers. The scheme is independently audited (Certification to EN45011) and is therefore an important measure in providing confidence to consumers and retailers that these standards are being fulfilled.

Membership of a quality assurance programme delivers high standards in animal welfare and food safety, while meeting the demands of consumers.

Inputs

The building of a new 240 place dairy unit is an investment in the future of dairy farming. Currently the herd is running at 140 cows, which means in 2015 when quotas are finally abolished the herd will be able to expand rapidly up to 240 cows to take advantage of the new market conditions.

The farm fitted water beds over 10 years ago in the cubicle shed and with the construction of the new housing facility, water beds have once again been chosen as the lying option for the dairy cows. The major improvement which has been made to waterbeds is the introduction of the “Dual chamber”. These specifically provide a cushioned area for the cow’s knees (which is especially important to the cow when laying and standing) and a separate pocket for the body and hind legs. Other bedding materials, like crushed rubber and canvas foam beds, can form compressed pockets allowing pools of urine and milk to collect which provide conditions allowing bacteria to grow and can cause environmental mastitis. As the dual chamber waterbed returns to its original convex manufactured shape, moisture flows away from the bed surface, not only providing a drier more hygienic bed but also meaning that the requirement for bedding material is reduced. Several studies have shown that waterbeds provide a surface which reduces the incidence of injury, and provide consistent long term comfort, over other forms of bedding materials.

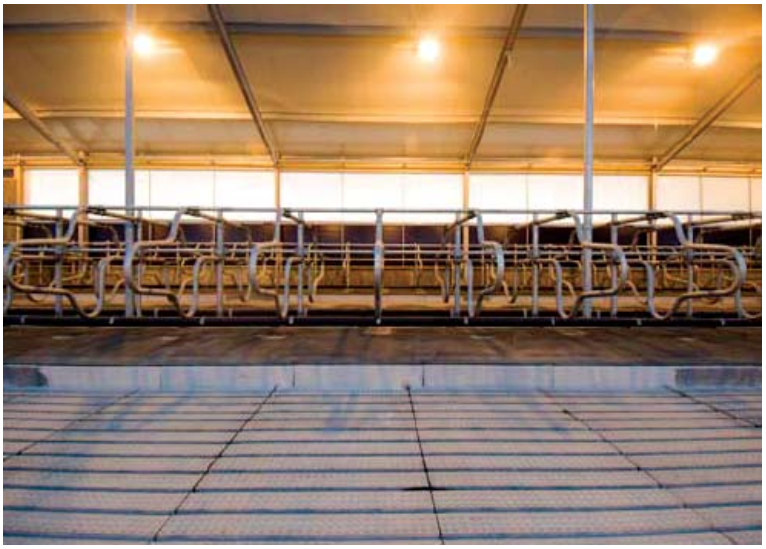
"The study compared 38 farms with rubber-filled mattresses, 27 with sand bedding and 29 with waterbeds. They scored cows for cleanliness, and lesions and swelling on their front and rear legs.

Among these herds, 72 per cent of cows in herds bedded on mattresses had hairless spots on their hocks, and 17 per cent had swollen lesions. Hock damage was rare in sand-bedded herds-only 25 per cent had hairless spots and less than three per cent had swollen hocks. At 35 per cent, cows on waterbeds had less than half the lesions of those on mattresses, and three per cent had swollen hocks. Although knee injuries were uncommon, they occurred most frequently in sand-bedded herds using very course recycled sand. Cows in sand-bedded stalls were slightly dirtier than those on waterbeds or rubber-filled mattresses. There was no clear difference in somatic cell counts, and cull rates were lowest for herds with waterbeds and highest for those with mattresses."

(Source: W. K. Fulwider et al, Influence of Free-Stall Base on Tarsal Joint Lesions and Hygiene in Dairy Cows, 2007)

ET

New facilities and bedding options provide the cows with improved comfort, resulting in reduced incidents of injury.



Operations

Focussing on core business

The farm's core business is to produce milk and grow grass as economically and efficiently as possible. To enable the farm to be able to focus on this core business, the calf rearing is no longer carried out on the farm and is undertaken by specialist rearers. Not only is the rearing of heifer calves a time-consuming activity requiring careful attention, it also requires significant financial investment. At two weeks of age heifer calves are sold to the specialist rearer and then four weeks prior to calving the heifers are purchased back by the farm. The sale/purchase costs are based on the current market value for the animal.

"A Teagasc study established that calf rearing in the Republic of Ireland accounts for 7% of annual farm labour input."

Robotic milking systems

The farm is a major advocate of robotic milking; having had the first two robots installed over 10 years ago, they have now invested in four new units which have taken pride of place in the new dairy building. The advantages of this system is not only the labour saving aspect (as mentioned under Staff) but the fact that cows are able to choose when they are milked. Depending on the stage of lactation and yield this can be anything from two to five times per day. There is also an improvement in milk yields due to the increased milking frequency (Pearson et al., 1979; Stelwagen, 2001). All the cows are individually identified by a micro-chip which is inserted inside a neck collar that the cows wear. As they enter the stall they are immediately identified by the computer, which calculates whether the cow needs to be milked or not. If the cow requires milking she is fed a pre-determined amount of food and then the robotic milker's laser system scans the cows' teats, cleans them and automatically attaches the clusters. There are several benefits to this system, the major benefit being that each quarter of the udder is milked individually (which is not the case for conventional milking systems). Other aspects such as milking speed, milk conductivity and yield are monitored, and this information is then used as an early warning method for any potential health problems that may occur.

"Adopting an automatic milking system on a Finnish dairy farm decreases the hours spent on animal husbandry by approximately 30 per cent. When comparing a milking parlour and the automatic milking system, the main economic benefit clearly results from the decrease in labour costs in automatic milking. In terms of economic profitability, the net return in automatic milking remains above that of the milking parlour system. A more flexible working time distributes the workload evenly during busy cultivation periods."

(Source: Terhi Latvala – Antti Suokannas, Adoption of Automatic Milking System: Profitability and Reasons For Adoption, 2005)

"Research confirms that the Lely Astronaut milking robot meets the requirements of teat cleaning that will come into force in Europe."

(Source: Jennie Osinga, Effectiveness of udder cleaning by the Lely ASTRONAUT milking robot, 2004)

Reducing lameness

The highest incidence of lameness on many dairy farms occurs over the winter housing period, which is why this farm has a strict routine of weekly foot-bathing. First the cows walk through a foot-bath with clean water and then through a second bath with a solution of formalin. This routine has been carried out over the last 12 years with great success; there are no infectious hoof conditions prevalent on the unit and locomotion scoring is undertaken six times per year (along with body condition scoring). With the use of locomotion scoring the farm is able to identify any cows with specific lameness issues and correct action can be implemented. All cows are also checked and trimmed (as required) by a professional foot-trimmer three times a year, allowing close monitoring of all cows feet on a regular basis by a trained and competent professional.

"The cost of a typical case of lameness is €200"

(Source: SAC Technical Note 599, Preventing Lameness in Dairy Cows, 2007)

The flooring in the dairy housing is automatically scraped every hour. This stops the 'wave effect' of a large amount of slurry being pulled through the building, which increases the contamination of cows' legs. The corrosive mixture of faeces and urine can have a damaging effect on the hoof.

ET

Specialist measures are taken to reduce the incidence of leg injury and lameness; including weekly foot bathing and automatic hourly scraping of the dairy house flooring.

Resources

"The Netherlands is one of the mostly densely populated countries in the world and this creates pressure on wildlife populations which are in search of habitats for feeding and breeding. In these circumstances, it is critical that the interests of wildlife are not overlooked in the response to increasing farm economics. The farm has an area of 15 hectares which it allows to be grazed by migratory wild geese over the winter period. This important habitat provides a much needed feeding zone for these birds. In return for this grazing habitat the farm receives an area payment as compensation for the lost grass production, which is in the region of 335-1100kg DM/Ha for first cut silage or early grazing, although there are no yield losses after first cut."

(Source: G.W.T.A Groot Bruinderink, The Impact Of Wild Geese Visiting Improved Grassland In the Netherlands, 1989)

Outputs

This farm provides an outdoor grass loafing area for the cows during the spring/summer period. The cows are offered this 'Free Choice' and can access the loafing area whilst still being able to return to the building for milking and feeding.

Outdoor grazing

"Highly intensive dairy systems (e.g. zero-grazing) are practiced in both the UK and Holland. In these systems research suggest that welfare risks relate less to the issue of behavioural restriction and more to the physical strains imposed on the cow through being housed for long periods on hard surfaces. Zero-grazing systems are associated with higher than average lameness scores and knee swellings relative to other farm types."

(Source: DEFRA Project AW1006, Behavioural studies relating to the welfare of intensively managed dairy cows)

Flooring and ammonia emissions

The most common housing for dairy cows, particularly on larger farms, is the free stall system. Cubicles are provided for resting, and animals have the freedom to move to the feeding area on an open floor. Manure is primarily deposited onto a solid floor that is frequently scraped or flushed or a slatted floor from which manure drains between the slats into a pit below. Nitrogen emission from these floor systems is nearly all in the form of ammonia. Under warm conditions, with faecal and urine materials well-mixed on the floor, nitrogen loss is high, with most of the urea transforming into ammonia and volatilising to the atmosphere. Under cold winter conditions, nitrogen loss is relatively low. On average, about 16% of the excreted nitrogen is lost from the free stall area.

The farm's new dairy building has incorporated a floor design which has a gutter feature allowing improved separation of urine and faeces. The urine drains into the gutters away

from the faeces and therefore reduces the amount of mixing that occurs. This separation reduces the level of ammonia emissions from the slurry by a minimum of 30% over conventional flooring types, which is an extremely important factor and will help the farm reduce its overall ammonia emissions. These measures are particularly important given the fact that the Dutch Government has set strict reductions in ammonia emissions for 2010.

"On solid floors, floor shape and surface characteristics can influence ammonia loss. A small, 3% slope of the floor allows urine to drain away from the faeces, reducing ammonia emission by 21% compared to solid or slatted level floors (Braam et al., 1997a). A double-sloped floor with a urine gutter in the centre reduced ammonia emissions by 50% (Braam et al., 1997b). A grooved solid floor system was evaluated that included perforations through the floor. The grooves enabled urine to move away from faecal material and then drain through the floor perforations. Compared to a traditional slatted floor system, the grooved and perforated floor reduced ammonia emissions by 46% (Swierstra et al., 2001)."

(Source: C.A. Rotz, Management to reduce nitrogen losses in animal production)

"Ammonia is an air pollutant largely emitted from agriculture that threatens significant areas of valuable habitats. Ammonia is a colourless gas composed of nitrogen (N) and hydrogen (H) with the chemical symbol NH3. The gas is released mainly during naturally occurring processes, i.e. the breakdown of the urea excreted by farm livestock and other mammals. Ammonia is very soluble in water and readily reacts with other substances in the atmosphere to form ammonium (NH4+) compounds such as ammonium sulphate and ammonium nitrate. Following the emission of ammonia gas to the atmosphere, it may be deposited to land either as gas or as ammonium-N compounds in rainfall. This can have profound effects on natural ecosystems."

(Source: DEFRA, Ammonia in the UK, 2002)

ET

EN

Modern, well-designed facilities enable the cows to demonstrate their natural behaviours and free choice in a safe environment. The floor design of the facilities also minimises ammonia emissions.

Future

The farm is situated 8km away from the dairy where the milk is delivered and processed. Future plans include the construction of an anaerobic digester on the farm, which will process all the cow slurry (other waste products may be included). The methane produced from this system will then be piped to the processing dairy where it will be used as a flammable gas (in conjunction with natural gas) to heat water to produce steam required by the dairy.

The farm is also applying to the Dutch government's Environmental Department to approve the new 'free choice dairy system' with a special green facility mark, which, if granted, will mean this is the first dairy farm to achieve this accreditation mark.

Appendix

Farm data for 2008/2009

Land (hectares)	**69.91**
Average annual milk yield (litres)	**9420**
Concentrate usage (tonnes)	**2.5**
kg of milk per hectare	**20,302**
Number of cows per hectare	**2.09**
Calving interval (days)	**396**
Replacement rate	**26%**
Labour units used	**1.7**
Fertiliser costs per hectare	**€165**

"Anton's dairy unit encompasses many great aspects of good practice and they are not just focused on one area of the business. The welfare of the cows is obviously one of the main areas of importance and with Anton's principle of the 'Free Choice' system, allows the cow to choose what she wants to do and when and in an environment which is designed to improve cow welfare and health. Reducing ammonia emissions is an important element of the livestock industry within the Netherlands and the farm has been implementing innovative ways of reducing their emissions. Anton has a refreshing outlook and a commitment in the long-term viability of the dairy industry which is great to see."

Karl Williams, Flagship Farms Programme Manager, FAI

Appendix

In Table 1, monthly SCC and Bactoscan results for Lely, single box AMS herds are compared to results of all Ontario herds shipping over 40,000 litres per month. This level of production was chosen to ensure AMS herds were compared to herds similar in size. Only Lely systems are analysed since this is the only system with sufficient data to produce a reasonable sample size. Likewise, data prior to February 2000 is based on less than 5 AMS herds and is not reported. The information in table 1 should be considered preliminary since even 5 to 11 herds is a very small sample size. SCC trends in Ontario AMS herds are similar to the Dutch results.

Table 1. Monthly Milk Quality of Ontario AMS herds compared to all Ontario herds shipping over 40,000 litres per month.

	Number of herds		Avg SCC ('000)		Avg Bactoscan ('000)	
Month	**Lely AMS**	**All herds***	**Lely AMS**	**All herds***	**Lely AMS**	**All herds***
02/2000	5	1380	256	225	33	37
03/2000	5	1608	236	232	21	44
04/2000	6	1495	251	225	24	28
05/2000	6	1603	262	234	34	34
06/2000	7	1426	296	258	73	65
07/2000	9	1450	342	274	68	30
08/2000	9	1452	328	276	40	41
09/2000	10	1376	288	261	62	36
10/2000	11	1450	248	225	24	26
11/2000	11	1355	251	220	63	34
Avg*			**276**	**245**	**41**	**38**

"Observations of increased standing and lying on rubber surfaces at the feed bunks highlights the importance of taking into consideration the comfort of the entire facility rather than concentrating on just a single component (Tucker et al., 2006). Results show that cows prefer to stand on softer flooring surfaces than concrete when eating (indicating that concrete flooring is uncomfortable) and that having softer surfaces near feed bunks may increase the time cows spend in the area, including time spent eating. There is also increasing evidence of a link between concrete flooring and development of lameness."

(Vokey et al., 2001; Cook, 2003; Somers et al., 2003; Vanegas et al., 2006)