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KITE CONSULTING

Focus Site Review – Year 1

Efficient Milking Routines

PREPARED FOR:

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1.0 Summary

- The aim of the Efficient Milking Routines Focus Site project is to increase the effectiveness of the pre milking routine to reduce milk times and teat end damage within the herd.
- The dairy enterprise at Ffosyficer is part of a larger farming business extending to 3,000 acres. The milking platform is 321 acres. The business operates a closed herd, all heifers are home reared, the current replacement rate is 20%.
- The farm is organic with milk used to manufacture the business own brand of Daoini products, surplus milk is sold to OMSCo.
- The herd average is 6,500 litres at 4.1%BF and 3.3% Protein and operates a calving block from September to December.
- An average conventional 1m litre dairy producer has the ability to greatly increase profitability by maximising their milk contract with regards to milk hygienic quality.
- Wiping with paper towels reduced TBC (cfu/ml) by an average of 48.8%, by comparison wiping with treated re-usable clothes reduced TBC (cfu/ml) by an average of 95.3%.
- Lactocorder testing was used to measure milk flow and highlighted issues with poor cluster position and over milking. Consequently take off milk flows were increased with an aim of reducing teat end damage.
- Post spray nozzles were not effectively covering the teat with spray, this was tested by spraying onto a paper towel and checking coverage. New nozzles were purchased for under £10.
- Milk meters were found to be incorrectly calibrated by upto 15%, as the feed was calculated from milk meter readings this was causing under and over feeding. The milk meters were recalibrated and the savings in feed were calculated as £30,345.
- Potential remains for follow on projects on the same theme such as monitoring noise levels within a milking parlour and collecting area, investigating various pre milking routines and Max-t milking which looks at timed cluster removal to increase milking throughput and reduce teat end damage.
- **The project clearly demonstrated some simple and effective changes that can have a huge effect on animal health and labour efficiency. Implementing a consistent teat preparation will increase lactational milk yields by 5.5% (Ruegg, 2005).**
- Other farms should consider dynamic milk testing as a means to improve milk quality, cow health and ultimately profitability.
- The project being more widely adopted would tie in with work looking at reducing on farm antibiotic use.
- The project should be communicated throughout the industry, a particular emphasis should be placed on getting milking routine messages to key milking staff. This could include posters and instructional videos that farm owners and managers could share. Consideration should be given to language barriers as part of this communication.

2.0 Business review

2.1 Comparable farm data (that are relevant to the project)

2.1.1 Financial benchmarking

The average milk quality for UK farms published by AHDB Dairy in the year to 31st March 2017 is listed below:

- 4.09% Butterfat
- 3.29% Protein
- 27,000 bactoscan
- 165,000 cell count

The average milk price received during this year was 25.61ppl (*AHDB Dairy*). The milk prices for March 2017 are listed below for the major milk buyers in Wales:

Companies	Annual Price
Aligned Liquid Milk	
Arla Foods - Sainsburys	26.96
Müller Direct Milk - Sainsbury (Profile)	27.30
Müller Direct Milk - Sainsbury (Seasonal)	27.23
Müller Milk Group - Co-operative	27.50
Müller Milk Group - Sainsbury	27.25
Müller Milk Group - Tesco	28.61
Standard Liquid Milk	
Müller Direct Milk - Core Formula (Profile)	31.09
Müller Direct Milk - Core Formula (Seasonal)	31.01
Müller Milk Group - Partnership	26.89
UK Arla Farmers Liquid 1	25.83
Standard Manufacturing	
Arla Direct Manufacturing	24.56
Glanbia - Llangefni	26.88
South Caernarfon Creameries	26.92
UK Arla Farmers Manufacturing 1	26.29
A&B	
First Milk - Haverfordwest (A&B Comp) 2	27.45
Freshways 2	27.09

(1) these contracts will receive a 13th payment of approximately 0.73ppl.

(2) price shown is a combination of both A&B prices.

The table below details the milk quality bonus/deductions for the 2 largest UK milk processors, Muller Milk and Ingredients and Arla.

Milk Hygiene-bactoscans				
Band		ARLA	MWDI	average
0	30,000	0.51	0.00	0.26
30,001	50,000	0.51	-0.25	0.13
50,001	75,000	0.00	-1.25	-0.63
75,001	100,000	0.00	-2.00	-1.00
100,001	200,000	-1.02	-4.00	-2.51
200,001	+	-5.12	-8.00	-6.56
Milk Hygiene-somatics				
Band		ARLA	MWDI	average
0	225,000	0.51	0.00	0.26
225,001	250,000	0.00	-0.25	-0.13
250,001	300,000	-2.83	-1.75	-2.29
300,001	400,000	-3.07	-6.00	-4.54
400,001	+	-5.12	-20.00	-12.56

As an example, a 1m litre producer currently selling milk with a bactoscan of 50,001 and a SCC of 250,001 would receive an average payment deduction (for these 2 contracts) of 2.92ppl or £29,200 annually. Improving milk hygienic quality to the top band (under 30,000 bacto and under 225,000 SCC) would result in a bonus of 0.52ppl or £5,200 – this would result in a net financial change of £34,400.

The Wales Farm Business Survey 2015/16 (most recent published) detailed the following averages for profit after rent and finance:

- Hill and Upland Dairy Farms - £25,791
- Lowland Dairy Farms - £52,596

The comparison of farm profits to bonus and penalty schemes for milk quality highlight the importance of maximising milk contracts on Welsh dairy farms.

2.1.2 Physical benchmarking

The dairy enterprise at Ffosyficer is part of a larger farming business extending to 3,000 acres. The milking platform is 321 acres. The business operates a closed herd, all heifers are home reared, the current replacement rate is 20%.

The farm is organic with milk used to manufacture the business own brand of Daoini products, surplus milk is sold to OMSCo.

The herd average is 6,500 litres at 4.1%BF and 3.3% Protein and operates a calving block from September to December.

2.2 Test results

2.2.1 Paper towels v cloths

Part of the project was to analyse the benefit of using washable cloths vs dry paper towels.

The table below details the reduction in TBC before and after wiping with paper towels:

Cow ID	TBC (cfu/ml)			Coliform Count (cfu/ml)		
	Before	After	Change	Before	After	Change
3188	329,000	207,200	-121,800	110	925	815
3514	96,300	52,100	-44,200	0	0	0
3625	387,800	233,800	-154,000	35	280	245
3669	719,600	249,200	-470,400	10,550	10	-10540
3826	128,800	43,100	-85,700	80	10	-70
3859	211,400	124,600	-86,800	40	0	-40
3868	16,150	49,600	33,450	5	0	-5
3871	16,300	39,500	23,200	0	75	75
3895	15,350	3,350	-12,000	10	0	-10
3931	51,100	5,400	-45,700	70	0	-70
Mean	197,180	100,785	-96,395	1,090	130	-960
Median	112,550	50,850	-65,700	38	5	-8

Mean reduction of 48.8%

Median reduction of 58.4%

The table below details the reduction in TBC before and after wiping with re-usable cloths:

Cow ID	TBC (cfu/ml)			Coliform Count (cfu/ml)		
	Before	After	Change	Before	After	Change
1026	318,000	10,900	-307,100	15	0	-15
1035	980,000	5,050	-974,950	65	20	-45
3412	67,500	4,900	-62,600	150	0	-150
3535	139,000	13,950	-125,050	1,085	5	-1080
3551	9,100	16,850	7,750	0	0	0
3712	24,550	13,000	-11,550	0	0	0
3761	29,000	3,500	-25,500	5	0	-5
3816	71,000	395	-70,605	5	0	-5
3844	2,290	215	-2,075	0	0	0
3903	5,050	7,950	2,900	0	0	0
Mean	164,549	7,671	-156,878	133	3	-130
Median	48,250	6,500	-44,050	5	0	-5

Mean reduction of 95.3%

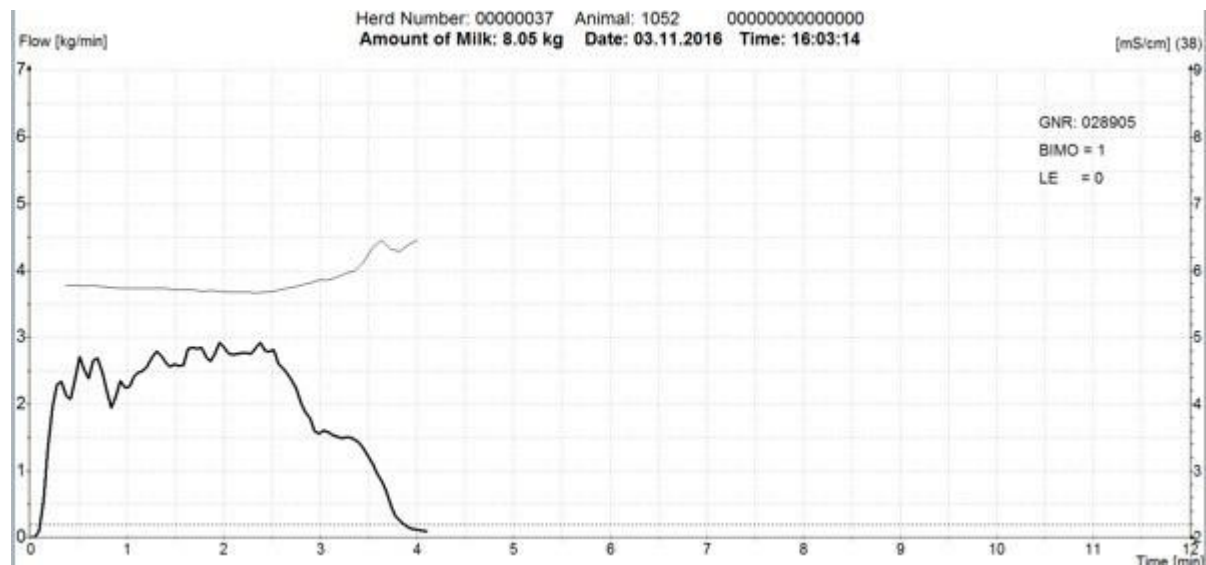
Median reduction of 91.2%

The improvements in efficacy of disinfection were great between the paper towel and the washable cloths. The reason for this was likely the chemical used as part of the washing process and that the cloths were moist when pre wiping. That said the time taken to wash the paper towels was felt excessive by the partners, as a result the cows are now pre wiped with a disposable paper towel which is dipped in an iodine solution prior to wiping. A follow up test should now be done to measure the efficacy of the new system.

The results of the new test could then be used to assess the viability of buying a washing machine and the additional cost of labour for washing the cloths. The cost of an industrial washing machine is in the region of £6,000.

2.2.2 Lactocorder results

A lactocorder is used to measure the flow of milk from the cow whilst the milking unit is attached. The graph below is an example of the readings taken:



The thicker black line details the flow rate over time. A steep gradient at the beginning depicts good milk let down, you then look for a steady flow rate throughout milking with again a steep gradient back down at the end.

Cluster position

A number of the graphs highlighted poor cluster positioning, in that milk flow was inconsistent throughout. It was agreed that the length of the milking pipes were not aiding cluster positioning in addition to the positioning of the swing arms. The long milk pipes were reduced slightly in addition to all staff being made aware of the importance of the position of the swing arm. The result was a reduction in cows milking out inconsistently.

Over milking

The recordings showed that all cows were over milked, this is depicted by having an elongated tail to the line graph. This is known to cause teat end damage which will increase mastitis rates. The ACRs take off rates were increased from 350gms to 450gms per minute over the project, the aim of this was to reduce teat end damage and speed up milking without adversely effecting milk yields and mastitis rates. The effect of the change has not been quantified.

2.2.3 Post spray

A number of the spray nozzles were not effectively covering the teats with post spray. New spray nozzles were purchased at a cost of £10. This is easily tested by spraying onto a paper towel. This had gone unnoticed before, meaning that it is likely unnoticed elsewhere.

2.2.4 Milk meters

Milk meters were found to be misreading in excess of +/-15%. As the milk yields in the parlour are being used to ration cows with concentrate, effectively some cows would be getting too much concentrate and some not enough. The project calculated this was costing the business up to £30,345 in miss allocated feed.

3.0 Project review – *Efficient milking routines*

3.1 Aims of the project

The aim of the project is to increase the effectiveness of the pre-milking routine with the aim of reducing milking time, and reducing any teat end damage to the herd. Milk flow monitoring will establish suitability of current system and measure impacts of changes introduced. The project has the capability to increase the value of the milk sold through increased quality, reduction in time spent milking, reduce penalties on milk value plus improve herd welfare, reduce cases of mastitis and therefore reduce antibiotic use on farm. Increased yields may also be seen.

The milking parlour is the most important machine on a dairy farm, however it is often overlooked on Welsh farms with most farmers unaware of how to measure and manage the performance of the machine and best match this to the herd. Best practice advocates farmers test their parlours using dynamic tests rather than just doing the minimum annual static test required by Farm Assurance.

The project will evaluate the current milking routine at Ffosyficer, the parlour will be dynamically tested with milk flow charts drawn up. The project will pool the knowledge of existing discussion groups as well as industry experts to develop best practice protocols. A re-evaluation will take place once these protocols have been implemented.

Ultimately the project aims are:

- **to improve milk quality**
- **reduce milking time**
- **reduce cases of mastitis**
- **maximise milk value (quality bonuses)**
- **increase milk yields**
- **reduce energy costs through enhanced milking routine**
- **development of best practice protocols**

3.2 Project analysis

3.2.1 SWOT analysis

STRENGTHS	The project was able to produce clear comparable data through both the dynamic milk test and subsequent milk quality. The project was innovative for the Welsh dairy industry. The outcomes were clear and repeatable for the wider industry
WEAKNESSES	Availability and cost of dynamic milk testing Different staff using differing routines
OPPORTUNITIES	Circulate findings to increase awareness and uptake Evaluate alternate teat preparation – pre dip, bush etc Evaluate the effect of other factors on cow and milk flow – operator noise, parlour feeding, level of stress inflicted on cows when moving from pasture or housing to the parlour etc
THREATS	Risk of producers altering parlour settings and causing mastitis, teat end damage etc

Not sufficiently communicating findings and proposed routines with milking staff

3.2.2 Other alternative options

The excellent work done as part of this project highlights the effect of milking parlour machine performance and milking routines. The work should be built on by investigating in other areas as discussed below:

Monitor noise levels - monitoring the level of noise in the milking parlour and collecting yard would enable the project to understand the effect of noise on cow stress. Cows which are subject to stress, release adrenaline, this will inhibit the let-down of milk. By monitoring milk let down, kicking and cows defecating. The cost of this project would involve dynamic milk testing over 2 blocks of 2 days (separate), the cows will be subject to more noise and interference in the one block compared to the other.

Evaluate and quantify the effect of different preparation - teat contact time is closely correlated to milk let down. Different options could be investigated such as mechanic brush, pre dipping, pre foaming etc. Again this would involve the cost of a dynamic testing machine and operative over different periods.

Max-t – timed cluster removal has recently been heavily discussed, particularly in New Zealand. A project could be implemented in which milking time, mastitis rates and milk sales were evaluated over a period of time.

Other areas could be considered to evaluate the stress impacts on both cows and operators such as parlour feeding, cow flow, standing times before and after milking. The work done could be built on to highlight the importance of the area to producers.

3.2.3 Potential for project on other sites

The project would be very replicable on other sites with the specialist used in this case. However the limitation will be the number of testing kits and operators. It should be considered as to whether training can take place for others to undertake this analysis.

The potential benefits to farmers are multi-faceted with reductions in mastitis, improvements in milk quality, reductions of animal and staff stress to name but a few. Devising a system, which clearly enables farmers to benchmark performance is key to increasing buy in.

3.2.4 Sensitivity analysis

The table below details the potential financial benefits of some of the areas discussed:

Factor	+/-	+/- benefit £
Mastitis	10 cases/100 cows	£2,000/100 cows
Labour efficiency	10 cows/hour	£2,500/100 cows

3.2.5 Evaluation

The project clearly demonstrated some simple and effective changes that can have a huge effect on animal health and labour efficiency. Implementing a consistent teat preparation will increase lactational milk yields by 5.5% (Ruegg, 2005).

4.0 Impact on the industry

4.1 Impact on individual businesses

If individual business were to undertake similar testing of milking equipment and procedures they could highlight areas of inefficiency within their business which could be having huge impacts on cow health, cow and operator stress, labour efficiency and ultimately bottom line.

The importance should not be understated of operator training, ensuring that protocols are set and staff follow these. Education and training are important to ensure that staff maintain procedures all of the time. If all staff have to maintain the same procedures herd milk averages will increase.

4.2 Impact on wider industry

Increasing pressures on the reduction of on farm anti-microbial use mean that the Welsh dairy industry must research and develop procedures which promote animal health and reduce the need for such drugs. Getting to the root cause of mastitis in this example through understanding the effect of the milking parlour and milking procedure on teat end damage will be a great step towards reducing on farm antibiotic use.

Ultimately the end product – milk, needs to be of the highest quality. Premiums will be paid for milk with low SCC and bactoscan. Furthermore improving the knowledge and standards of the Welsh dairy industry across the board will reduce the risk of damaging press articles.

4.3 Innovative ways to communicate outcomes and encourage uptake

A wealth of knowledge is available from around the world in to the effect of milking procedures and what is best practice. The issue is dissemination of this information, although it is important to educate the farmers of the effects of milking routines – and this should continue. It is more important to ensure that all milking staff understand why they are doing what they are asked to do. A series of workshops specifically aimed at farm staff on a practical level would be beneficial. In addition a resource available to farmers for training purposes of new and existing staff would help, this would ideally be in the form of a video available online in both Welsh, English and potentially other languages. This could be supported by handouts and posters.