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FOREWORD

The Teagasc/Dairygold Somatic Cell Count joint programme delivered real results for dairy farmers very quickly and showed that Teagasc advisors in cooperation with Dairygold milk advisors have the knowledge to solve SCC and mastitis problems.

This programme removed a heavy burden from the shoulders of many suppliers who had despaired of ever reaching the goal of milking a low SCC mastitis free herd. Apart from mitigating financial loss many suppliers state that the success of the programme means they now look forward to milking rather than facing into the parlour and dealing with new infections, cross cows, veterinary treatments, segregating cows, disposing of milk etc.

As part of the Dairygold supplier education programme this project used some novel practical hands on approaches. One such approach was individual farm visits at milking time. This enabled advisors to assess practices and husbandry at first hand. As recommendations were then tailor made for the individual supplier and could be demonstrated on site, the success rate of getting change in practices was high.

I am particularly pleased that over the period of the programme, Dairygold suppliers have improved the society SCC and are among the premier suppliers in this regard in the country.

I wish to convey my appreciation to all who made the programme such a success.
I especially want to thank Noel Coughlan, the milk advisors and Liam O Flaherty of Dairygold, Teagasc advisors Don Crowley, Gerard Mc Mahon, Tom Weldon and for back up from Moorepark colleagues Eddie O Callaghan, David Gleeson and John Maher.

Dermot Mc Carthy
Asst. Director of Advisory Services

INTRODUCTION

In 2006 Dairygold identified the need to initiate a programme at farm level specifically targeted to help our milk suppliers address the issues of mastitis and SCC . At the time it was clear to us that the economic and production losses that were being experienced needed to be tackled and resolved through a practical, focussed and cost effective advisory programme. Following consultation with Teagasc at that time, the joint Dairygold Teagasc SCC Programme was set up.

Over the past four years this programme has yielded considerable benefits to our suppliers in terms of helping them to address the problems associated with mastitis and SCC. The programme has also helped quantify and increase awareness of the significant costs on farms resulting from these issues.

I am very pleased that the key learnings from the joint programme have now been captured in this booklet. Our goal is to communicate to the widest audience possible the messages gained from on farm practical experiences over the last four years. It also clearly identifies the considerable costs to the dairy industry, as a whole, from mastitis.

As a milk processor, Dairygold has also seen the benefits from the improved quality of milk supplied as a result of this programme. We are very conscious of the need to continually improve the quality of our milk pool through working closely with all stakeholders. We recognise that the programme that we started in 2006 will continue to deliver benefits in 2011 and beyond.

As we look forward to a new phase of dairy expansion I firmly believe the management of all aspects of herd health is key to our success as an industry and every effort must be made to ensure that all stakeholders are supported to achieve our common goals.

I would like to acknowledge the very significant contribution made by the Teagasc advisors, Ger McMahon, Tom Weldon and Don Crowley who worked closely with our own milk advisory staff throughout the programme. The practical approach that the programme developed to tackle mastitis on-farm has been recognised as a blueprint for others to follow.

I would also like to thank our own suppliers whose farms are featured in the booklet for allowing their details and figures to be used.

Let us continue on this ‘quality journey’ post quota.

Jim Woulfe
Chief Executive

4 OBJECTIVES

In January 2006 Dairygold Co-Op identified the need for a targeted, practical programme at farm level which would help suppliers improve the quality of milk they produced. At that time SCC levels in milk were showing an upward trend, within both the Dairygold and National milk pools. It was decided therefore that the main focus of this initiative should be mastitis control and SCC reduction.

Following a period of consultation, a joint programme between Dairygold and Teagasc was set up. Two experienced dairy advisers with specific expertise in milk hygiene and mastitis control were appointed to this new programme.

The objectives of the programme were to

- Help suppliers to reduce the level of SCC in milk supplied to the Co-op
- Devise a standard on farm approach to solve the problem of high SCC on farms.
- To improve overall milk quality in line with the balanced score card payment system.
- Transfer the knowledge gained from the programme to the Dairygold advisory team

Results Achieved

The graph below (Figure 1) shows the index of the Average SCC level of the milk supplied to Dairygold over the period of the programme. The society average SCC fell by a total of 11% over the life of the programme. The reduction achieved as a result of the programme is expected to continue into the future.

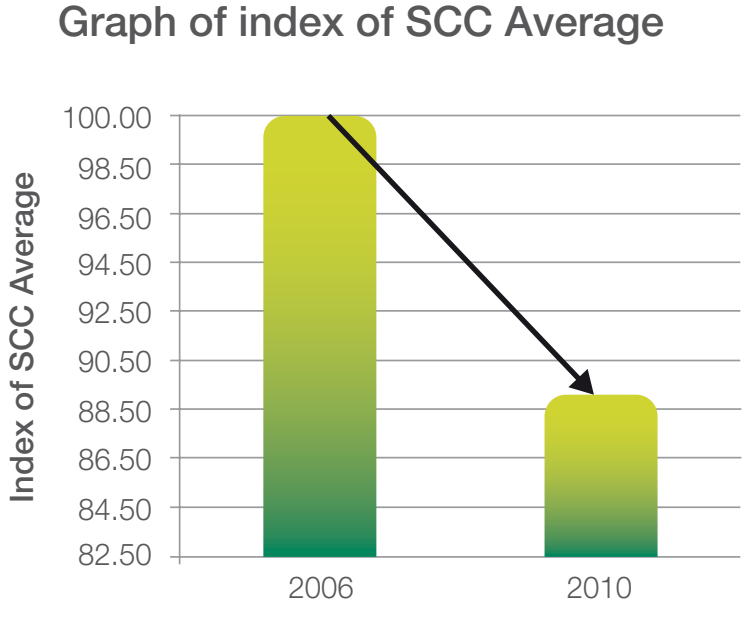


Figure 1 - Index of SCC in Dairygold herds 2006 to 2010

APPROACH TAKEN 5

Understanding the problem

The first priority for the programme was to identify the root causes of high SCC in milk at farm level. A series of farm visits and intensive assessments of milk quality problems on farms were conducted in order to understand the main causal factors.

The following was the approach used to gain an understanding of the key factors on farm;

- Advisers visited farms during milking
- Farmers milking practice and routine were assessed
- Milking equipment was evaluated and tested fully
- Electrical installations were tested
- Infection control effectiveness was assessed
- Bacteriology and sensitivity sampling were carried out
- Records were fully analysed, where they were available

Capturing the Information

In order to accurately capture the key issues, a standard questionnaire was used to record the causes of milk quality problems on each farm visited. The questionnaire surveyed up to fifty different aspects of herd management, milking practices and equipment used.
These questionnaires were statistically analyzed by Dr. Patrick Kelly in Moorepark and a ranking of the most common faults was developed from the results.

This analysis showed that the main causes of high SCC could be divided into three separate areas i.e.: Milking Machine, Milking Practices and Infection Control.

Identifying the Key Issues

Based on all of the information obtained, the programme team were able to list the key areas to be investigated in order to solve a farm cell count/mastitis problem. The main areas are below

APPROACH TAKEN

Teagasc | Dairygold

Milk Quality Programme 2006 -2010

Milking Machines

- Wrong fall in milk line and milk entries not in the top third of milk line.
- Vacuum Problems i.e. inadequate reserve or high vacuum levels.
- Blocked air bleeds.
- Faulty pulsation.
- Liners not changed regularly.
- Stray Voltage

Milking Practices & Farm Practices

- Taking clusters off under vacuum
- Poor infection control during milking.
- Over milking.
- Not Milk Recording.
- Inadequate replacements.

Infection Control

- Pre-stripping cows with no gloves or no pre-spraying.
- Not properly applying post milking teat spray.
- No disinfection of clusters after problem cows.
- Culling the wrong cows.
- Ineffective Dry cow Therapy.
- No isolation of problem cows i.e. milked last or create a separate group.
- Poor teat condition

The identification of the key areas above means that all farmers can use these as a checklist to work with their advisor to identify the source of their problem and what an effective solution is.
The recommendations that are contained in this booklet are based on experience and have led to rapid and continuous progress in improving milk quality at farm level.

Solving a cell count Problem

Stop the spread of infection by:

- Correct teat spraying and dipping all clusters post milking. This has been found on farms to be the single most effective way to reduce cell count and mastitis, see figure 2 for the routes of infection for S. aureus.
- Stop damage to teat ends caused by milking machines and poor milking practices.
- Regular Cell count testing at least 6 times per year through milk recording is essential, to correctly identify cows that should be culled. Thousands of cows have been culled wrongly, due to inadequate records.
- Prompt and effective treatment of clinical cases is essential, along with appropriate dry cow tubes and the use of teat sealers.
- Always seek advice to help you solve an SCC problem

Maintaining a Low Cell Count

- Wear Gloves. Post spray all cows.
- Dip clusters after clinical cases and high cell count cows.
- Ensure milking machine is serviced annually and the report is available for independent assessment.
- Milk recording a minimum of 4 times per year is an essential tool in managing cell count. Prompt and effective treatment of clinical cases and appropriate dry cow tubes and the use of teat sealers.

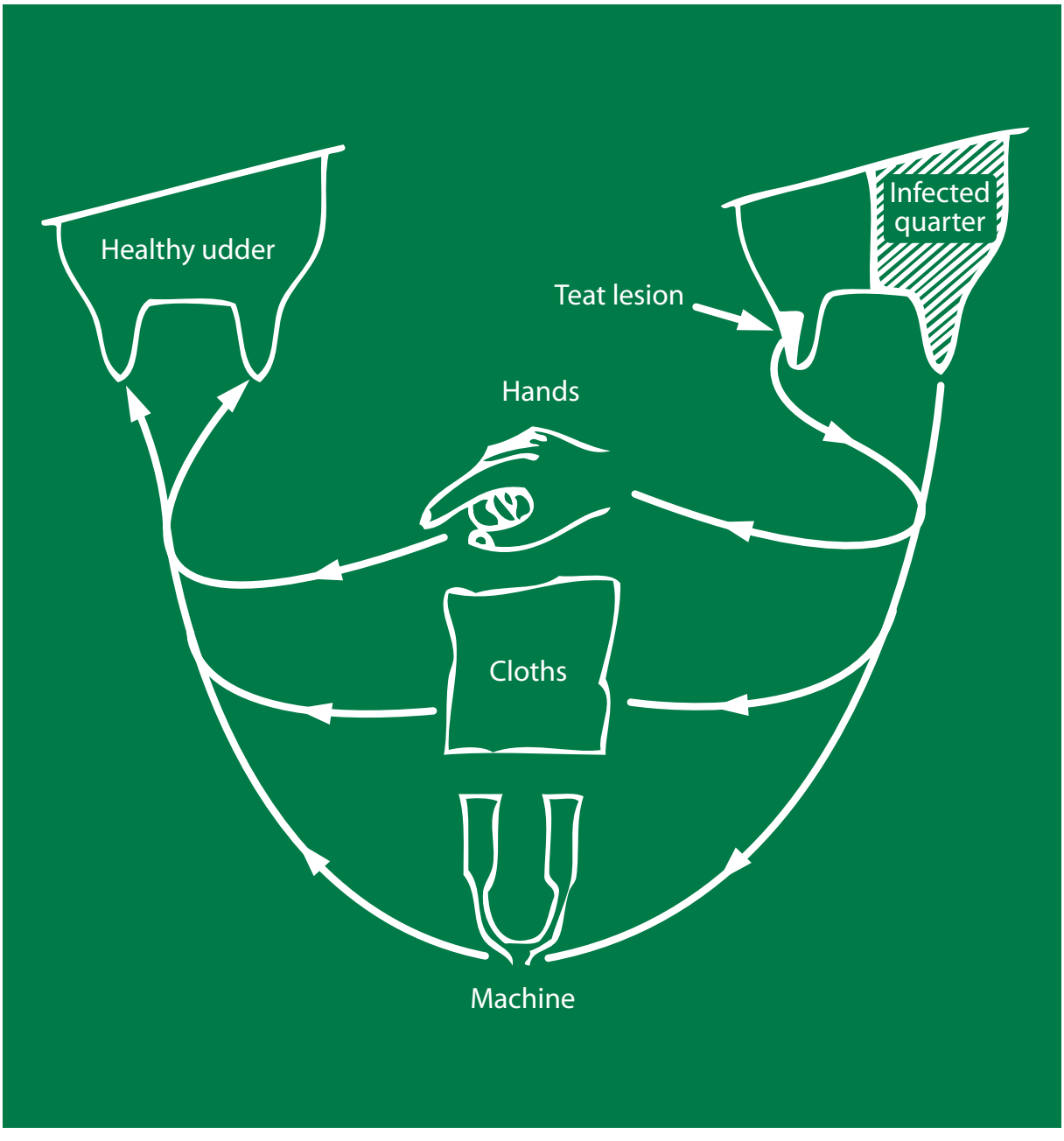


Fig 2. Diagram of Staph Aureus infection spread.

ESSENTIAL TOOLS 9

Good clean Calving Boxes

Bright, easy to clean and disinfect with good handling facilities.

Clean Dry Cubicles

Run Scrapers every 3 hours minimum, avoid over crowding.

Train Heifers Early

Check heifers regularly, teat spray or dip 5 days prior to calving will help reduce risk of mastitis.

Keep collecting yards Clean

Clean Clusters and Environment

CONCLUSION 11

The Teagasc/ Dairygold Programme, was successful in reducing cell count, incidences of clinical mastitis and thus eliminating the need to dump milk.

Farm visits at milking times were an essential tool, in identifying the causes of the problem and led to specifically tailored practical solutions that could be implemented. These were successful in achieving rapid progress, thus ensuring farmers continued to implement the improved practices.

Mastitis control and low SCC are achievable irrespective of how bad the situation is. The first step is to recognize that a milk quality problem exists. The next step is to stop the spread of infection; the priority is protecting the low cell count cows from infected cows.

It is crucial to identify the bacteria causing the problem. Milk recording is essential to help identify and cull chronic infected cows (3-4 tests >1,000,000 SCC).
Teat condition and proper disinfection are crucial to prevent bacterial growth. This was particularly evident, with a significant number of farmers stopping teat spraying.

The time scale for improvement depends on many factors; the top four factors dictating improvement are the number of replacements available, availability of milk records, good hygiene and milking practices, and a properly serviced milking machine.

Key Message

- The essential features in successfully tackling the problem were improved infection control, elimination of damage to teat ends by either milking machine or milking practices
- Effective dry cow treatment and culling of chronic cows based on improved record keeping and/or drying off of infected quarters where appropriate, ensured optimum supply while preventing cross infection.

12 CASE STUDIES

The farm visits demonstrated the many costs and substantial losses due to SCC and mastitis (see appendix 1).

Applying some of the measures identified by the programme highlighted how a rapid improvement in SCC can be achieved.

Key elements of the success on each farm were

- Availability of Milk Recording Records.
- Having Adequate Replacements.
- Good hygiene and good facilities.
- A willingness by farmers to address the problem.
- To highlight the workings of the programme, three milk suppliers who participated in the programme have kindly agreed to have their farms featured in this publication, for the benefit of all Dairygold Co-op suppliers.

Please note the milk price used in these examples to calculate financial figures was set at 30 cents per litre. Veterinary product prices were averages over the period.

CASE STUDY 1

A herd with a rising bulk tank SCC levels over a number of years.

Farm Details

- This farm operated a liquid milk production system.
- 100 cow herd with a 30:70 split calving pattern
- Average yield 7718 litres (1700 gals)
- Cows were milked in a fourteen unit parlour with no automatic cluster removers (ACR's).

Problem

- Outlined in Figure 3 below is the evidence that there had been an ongoing issue with clinical mastitis and a rising SCC problem in the herd.
- Intensive culling was carried out plus alterations to the milking machine, preventing stray voltage issues but with no success.

Observations

- A visit to the farm was carried out during milking in June 2006 to assess milking practices, teat condition and infection control. On culture Staph aureus was identified. This is a contagious bacterium which causes clinical and sub-clinical mastitis.

The following observations were made

- Milking practices ; the row time was fourteen minutes per row (This was too long)
- 50% of the herd had severe teat end damage (Hyperkeratosis) (see picture next page)
- All cows were washed extensively and dried; cows were sprayed with an automatic sprayer installed in an exit crush which was not working properly.
- Cows were comfortable and stress free. Electrical installations were assessed and were not faulty.

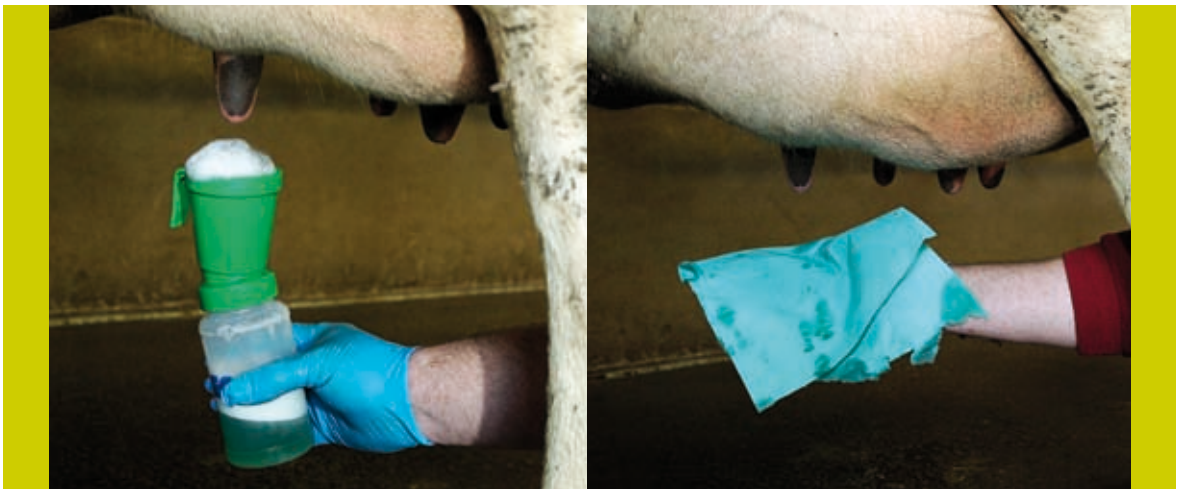
CASE STUDY 1
Teagasc | Dairygold
Milk Quality Programme 2006 -2010

- Milking machine was fully tested and was in good working order.

Example of teat and damage (Hyperkeratosis)

Actions Taken and Solution

- Row times were shortened to 9 minutes (from 14) this was achieved by changing the washing routine to pre-spraying and dry wiping.
- All milkers started to wear gloves to minimise the spread of infection.
- All cows were teat sprayed post milking.
- Clusters disinfection between cows was introduced for 2 wks. (20 mls peracetic acid to 9 litres (2 gallons) (0.2%) of water, changed after 10 clusters dips). Note picture below.



A barrel is used in the pit to provide sufficient solution for both morning and evening milking for 100 cows. (An alternative is milking problem cows last).

- Cows with problems were tested using the California Mastitis Test kit (CMT) during lactation and prior to drying off. This allowed for the identification and treatment of infected quarters under veterinary advice, both during lactation and in the dry period.

Typical cluster dipping layout in parlour pit.

CASE STUDY 1
Teagasc | Dairygold
Milk Quality Programme 2006 -2010

Having made the recommended changes almost immediately new cases of mastitis stopped, cell count dropped continuously to 140,000 from a high of 304,000. Culling of cows for mastitis was no longer necessary. The loses that were being experienced on this farm due to mastitis are detailed below.

Costs of Mastitis in June 2005 to June 2006

Penalties/loss of bonus	€2313
Clinical Mastitis	€4,648 (83 cases of Mastitis @ €56 per case treatment cost)
Production Loss	€5,126 (176kgs loss per cow @30 cent per litre on 100 cows)
Culling Costs	€3,400 (4 cows culled @ a net cost of €850 per cow)

Total cost	**€15,487**

By implementing the programme recommendations the above loses were reduced/eliminated. Also a direct positive impact on farm profitability in the subsequent years has been seen.

SCC Figures

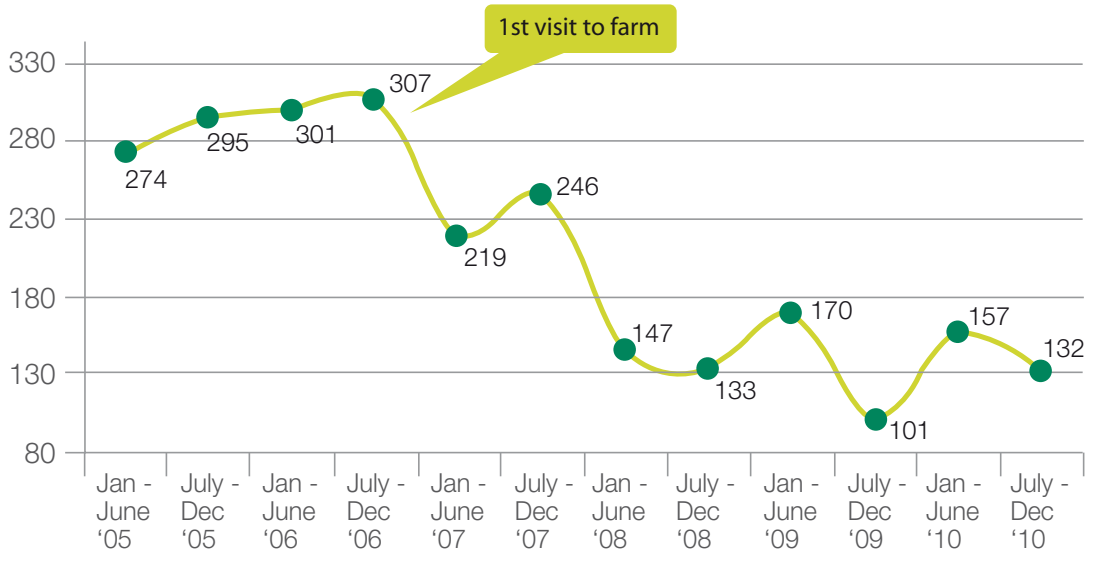


Figure 3: Average SCC results for herd

CASE STUDY 2

A farm with a sudden increase in the incidence of clinical mastitis

Farm Details

- A spring calving herd with 50 cows
- Herd yield 6600 litres (1450 gallons) at 4.31%fat and 3.57% protein.
- Cows are milked in a 6 unit herringbone parlour
- 20 replacement heifers are produced every year. 10 of these animals are sold with the remainder entering the herd.

Problem:

- In the spring of 2008 an outbreak of clinical mastitis occurred with an increase in SCC in bulk

CASE STUDY 2
Teagasc | Dairygold
Milk Quality Programme 2006 -2010

tank samples. In 2008 a total of 55 cases of clinical cases occurred in the herd. A visit to the farm in July 2008 set about investigating the problem.

- A laboratory culture of milk identified, Strep Uberis, Staph aureus and Strep agalactiae. This demonstrated a mixed infection in the herd showing environmental and contagious mastitis.

Observations from investigation

- Herd SCC had risen sharply over two years with an outbreak of clinical mastitis.
- Faulty vacuum regulator. This was leading to inadequate vacuum reserve. It is very important to maintain a steady vacuum level during milking.
- Faulty shut off buttons in clusters, causing clusters to be removed under vacuum resulting in teat end damage.
- Excessive length in long milk tubes.
- Stray voltage was identified as an issue that needed attention.

Actions taken and solution

- The milking machine was fully serviced and the faulty regulator and cut off buttons were repaired. This meant that clusters fell off cows when removing them from the cow.
- The long milk tubes were shortened to ensure not more than 6 inches of a drop into the pit.
- The electric cable connecting the milking parlour to the meter box was inadequate and needed upgrading. The meter box was moved to the parlour.
- To control spread of infection, the following procedures were recommended.
- All milkers to wear gloves during milking.
- All cows were pre-dipped with chlorohexidine foam dip and dry wiped with paper towels prior to milking.
- Cluster dipping all clusters in a peracetic acid solution, between cows to stop cross infection was introduced.

- All cows were sprayed post milking.
- Culture and sensitivity tests were carried out to establish the causal organism.
- CMT tests were done on problem cows, during lactation and prior to drying off.
- Used appropriate dry cow therapy, based on sensitivity and Veterinary Advice.

Response to Dry Cow therapy

Individual Cow Results: In the table below are examples of cows with high SCC levels. The table demonstrates the effect of age of cow and the response to proper drying off treatments.
Results Obtained after Dry cow treatment:

Cow Number	Lactation No.	SCC June 2008	SCC June 2009
311	3	1,150,000	205,000
415	1	1,118000	83,000
366	1	3,019,000	285,000
368	1	2,054,000	168,000
207	6	252,000	364,000

CASE STUDY 2
Teagasc | Dairygold
Milk Quality Programme 2006 -2010

Results and Financial gains

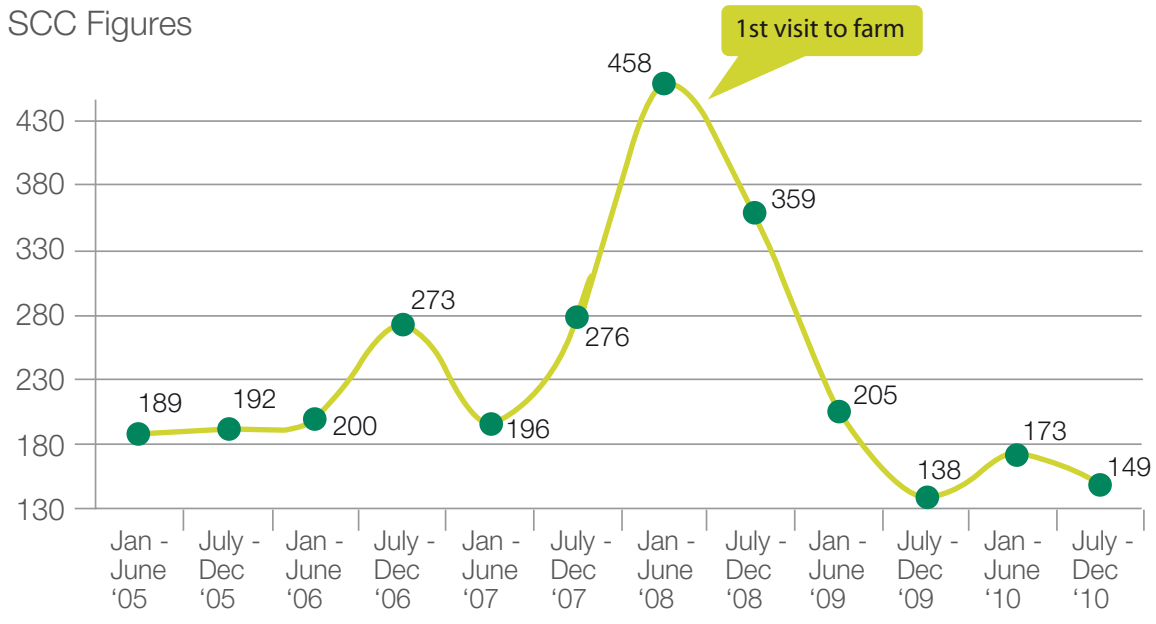


Figure 4: History of SCC levels on case study 2.

Cost of Mastitis on this farm

Penalties	€291 (2 cent per litre penalty 14,550 litres)
Clinical Mastitis	€3,080 (55 cases @ €56 cost per case.)
Production Loss	€3844 (264kgs loss per cow @30 cent per litre on 50 cows)
Culling Costs	€2,550 (3 cows culled @ a net cost of €850 per cow)

	€9,765

By implementing the programme recommendations the above loses were reduced/eliminated. Also in the years since the first case there has been a direct impact on farm profitability.

Following implementation of the programme outlined there were no cases of clinical mastitis during the period January to September 2009 and SCC fell from 458,000 to 170,000.

A Farm experiencing a high level of clinical mastitis.

Farm Details

- 140 cow spring calving herd
- Cows are milked in a 20 unit recording jar plant with no cluster removers.
- Two milkers are present in the spring with 1 milker present in the summer and autumn.

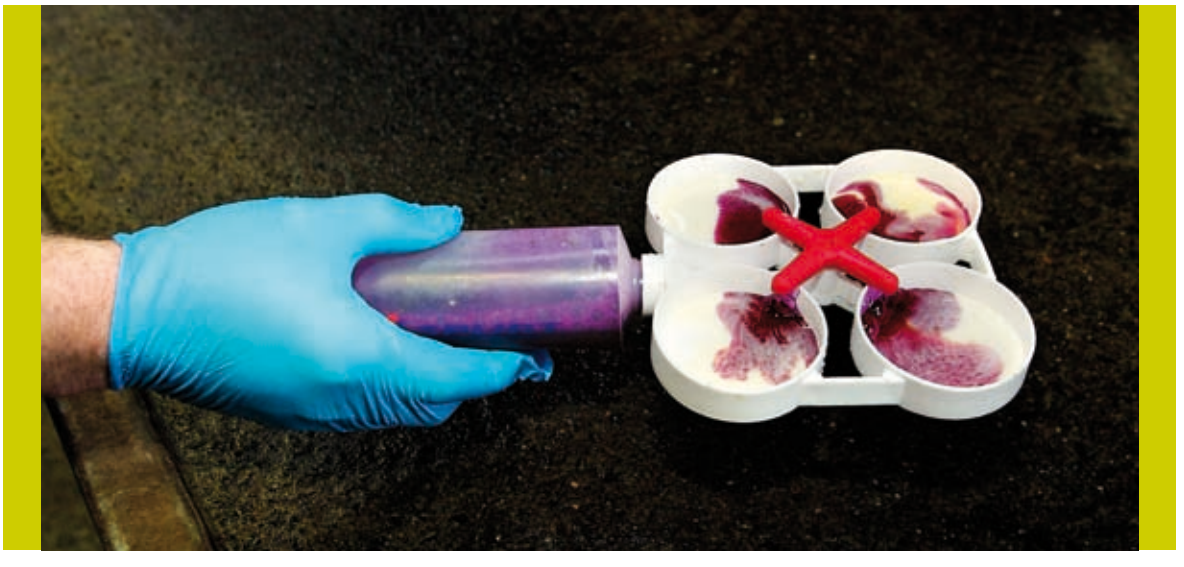
Problem

- The farm had been experiencing high levels of clinical mastitis. From culture and sensitivity testing Staph aureus and Strep Uberis were identified in the herd.

CASE STUDY 3
Teagasc | Dairygold
Milk Quality Programme 2006 -2010

Observations from investigation

- A high incidence of teat end damage (hyperkeratosis).
- Pulsation ratio at 70:30.
- A high degree of over milking.
- All cows were teat sprayed post milking.
- Milking Machine was in good condition.
- Stray voltage was identified as a problem.
- Short acting dry cow tubes were being used. The investigation also identified resistance to dry cow antibiotic from culture and sensitivity, and milk recording interpretation.



CMT Test Kit: Fig 1. above

Actions Taken and solution

- Reduced pulsation ratio to 68:32 or 65:35.
- Avoided over milking. It was important to be more aware of when cows were finished milking. Checking the claw bowl and not the jar was recommended to identify cows finished milking.

- All milkers were to wear gloves during milking. (e.g. Nitrile Disposable gloves)
- A programme to pre spray and dry wipe all cows prior to milking was introduced for 2 weeks.
- Cluster dipping all clusters in a peracetic acid solution, between cows to stop cross infection was introduced.
- Introduce post spray for all cows after milking.
- Culled chronically infected cows.
- Used long acting dry cow tubes.
- The electricity supply meter box was moved to the milking parlour.
- CMT test used to identify problem cows, during lactation and prior to drying off.
- Used appropriate dry cow therapy, based on sensitivity and Veterinary Advice.

Results and Financial Gains

There has been a significant drop in incidence of mastitis and in bulk SCC over a two year period. It has taken until 2009 to achieve a bulk SCC count under 200,000 on a regular basis. It is important to note that on many farms with similar problems, it may take two seasons to achieve less than 200,000 SCC on a regular basis. Figure 5 below shows the SCC profile of the farm over a four year period.

CASE STUDY 3

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Milk Quality Programme 2006 -2010

SCC Figures

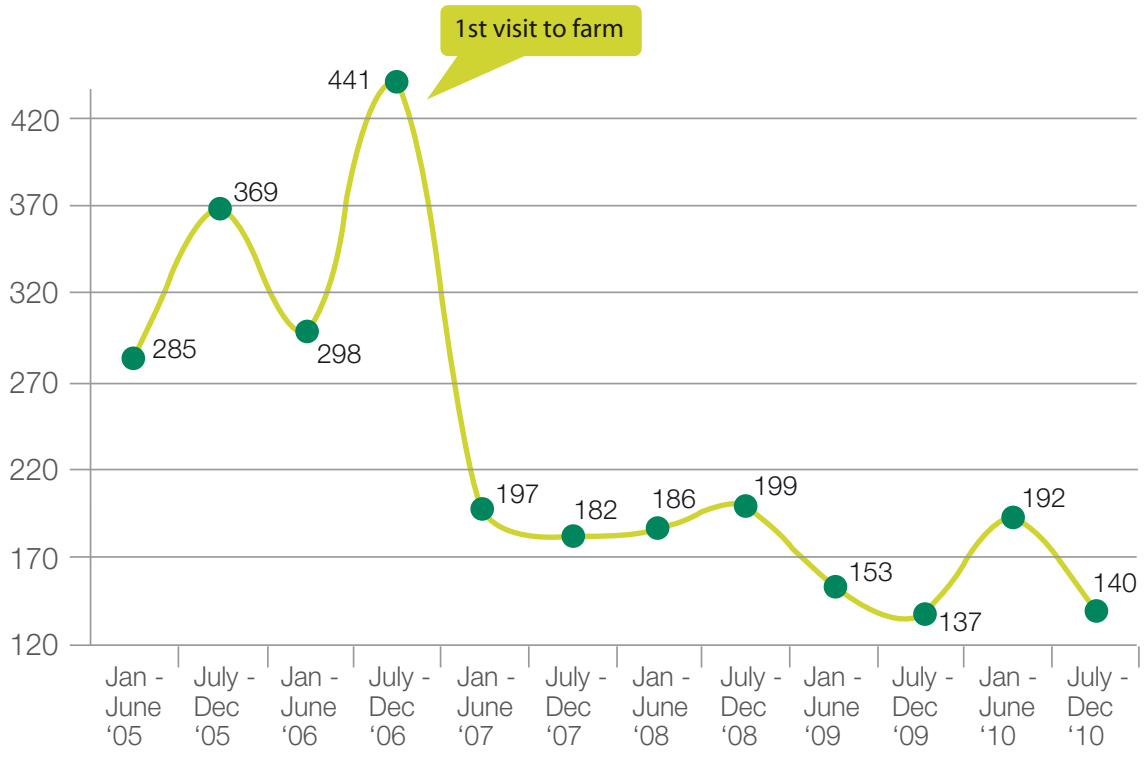

Figure 5 : SCC profile 2005 – 2009 of Case Study 3.

Cost of Mastitis

Penalties	€2,138 (2 cent per litre penalty on 106,900 litres
Clinical Mastitis	€1,680 (30 cases @ €56 cost per case.)
Production Loss	€7,177 (176kgs loss per cow @30 cent per litre on 140 cows
	----------
	€10,995

By implementing the programme recommendations the above loses were reduced/eliminated. This has led to a continuing positive impact on farm profitability.

Estimated Potential Losses Due to SCC at Farm level

Often many of the losses due to SCC and mastitis are not fully calculated. The list below gives some worked examples of the potential losses that can be experienced. (Note we are not saying that these losses happen in every case, but they illustrate potential losses)

1. 5 -15% of milk being disposed of on a monthly basis in attempting to keep under 400,000 SCC bulk tank measurement.

   E.g. 10% of 300,000 litres = 30,000 litres @ 30 c/l = €9,000 annual cost.

2. Cows culled due to high SCC and/or mastitis
   - A replacement costs €1,350 to enter the herd. A cull is worth €500 approximately.
   - Net cost is approximately €850/cow.
   - 60 cows with 10% of cows being culled = 6 cows = loss of approximately €5,000

3. High levels of clinical mastitis occurring in herds.
   Problem herds may have much more than 30 cases per 100 cows per year. This figure is closer to 50 cases/100 cows per year for many herds with problems. The cost of a clinical case is outlined as follows in Table 1:

Table 1: Cost calculation of a Clinical Mastitis incident

Antibiotics	€10 minimum (i.e. 3 tubes @ €3 per tube)
Discarded Milk	€36 (20 litres/day x 6 days = 120 litres x 30 cent/l)
Labour	€10 (42 min) [5 min/milking x 2 milkings/day x 3 days of treatment] + [2 min/milking x 2 milkings/day x 3 days of withholding milk]
Total	**€56**

The cost of one incident of mastitis is an estimated €56. The cost of various rates of clinical mastitis is shown in Table 2.

Table 2: The Cost of different clinical mastitis rates in 100 cow herd.

Number of clinical incidences	Cost (€)
10	560
20	1,120
25	1,400
30	1,680
40	2,240
50	2,800

APPENDIX 1
Teagasc | Dairygold
Milk Quality Programme 2006 -2010

A hidden effect of high levels of SCC is milk production loss. This is caused by the bacteria/bug damaging the milk secretory tissue. The loss in milk production occurs not only in the short term during infection but also after the infection is cured. This milk production loss is often not obvious and is a hidden loss in milk returns over the life time of the cow. It is hard to estimate what this level of loss is, but the estimate of loss as published in the Milk Quality Handbook (as published by Teagasc Moorepark) is outlined in the table below.

Relationship between SCC and Milk Yield Loss

SCC Mid Point (Range	Milk loss for 1st Lactation (kg)	Milk loss for subsequent Lactations (kg)
25,000 (18,000-34,000)	0	0
50,000 (35,000-68,000)	0	0
100,000 (69,000-136,000)	88	176
200,000 (137,000-273,000)	176	352
400,000 (274,000-546,000)	264	529

25 1st lactation cows @ 88 kg = 2,200
75 older cows @ 176 kg = 13,200
Total= 15,400 kg = 14,951 Litres

Loss: 14,951 Lts @ 30 c/l ≈ €4,485

Loss of bonus for milk quality and/or penalties for poorer milk quality are also direct costs to the supplier. These can be significant.

There are many other costs that can be added on to the above. Veterinary assistance may be required, quarter losses due to mastitis, death of cow, etc. In addition, problems can occasionally occur where inhibiting substances (antibiotics) end up in the bulk tank. The penalties associated with this are significant.

The cost for labour associated with milk quality problems cannot be over estimated. Each episode of mastitis requires a lot of time for treatment and management. If the farmer spends a lot of time 'fire-fighting' mastitis/high SCC then there is less time and enthusiasm for other tasks and management of other issues on the farm.

Finally, there is the stress factor and physiological challenge for the farmer associated with having ongoing milk quality problems. The effect of stress cannot be overstated.

ACKNOWLEDGEMENTS

The improvement of milk quality is a team approach and requires the dedication of a large number of people. The improvement of milk quality is a financial gain to farmer and Co-op, allowing the production of high value added products.

We wish to thank all the farmers we have worked with us over the past few years, particularly the three farmers who allowed us to use their information for the particular case studies.

This project was made possible by the foresight of the Teagasc and Dairygold Board, Chairman Vincent Buckley, Chief Executive Jim Woulfe and Dermot McCarthy Teagasc.

Many people helped to initiate and help with this project; we would like to thank Billy Kelleher, John Maher, Jerry McCarthy AMU, Tom Egan AMU and Tom Ryan for all their help over the years.

We wish to thank Dairygold Milk Quality team and management; Eamon O'Sullivan, Liam O'Flaherty, Noel Coughlan, John Cronin, Frank O'Flynn, Maeve O'Connor, William Ryan, Jack Cahill, Ger Hennessy and Dan Curtin for all their help and work in this joint programme.

Great assistance was received from the Dairy Research Team in Moorepark, lead by Dr Pat Dillon, Dr Eddie O'Callaghan, Dr Bernie O'Brien, Dr Dave Gleeson and Dr Patrick Kelly.

Finally we wish to thank all Teagasc Dairy Advisers and Dairygold Staff for working with us through their discussion groups and individually with their clients to get the message out as clearly as possible.