SECTION VII: MONITORING AND GOAL SETTING

TABLE OF CONTENTS

1. SMART - FARM SPECIFIC AND ACHIEVABLE

When developing goals on-farm, it is important to take step-by-step approaches and plan carefully to ensure that each goal will be done correctly, and that these methods will be implemented into routine management practices. Whether the goal is big or small, producers can benefit from using the "SMART" system when dealing with specific practices on-farm. The SMART system is outlined below:

1.1 EXAMPLE OF A GOAL OUTLINE USING THE SMART SYSTEM

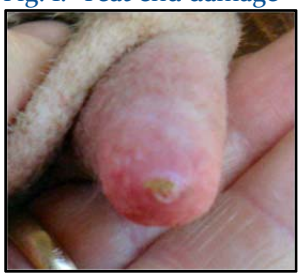
The following example could be a common goal for producers to help improve udder heath in their flocks. Teat end damage is a known risk factor for clinical and sub-clinical mastitis. Over-milking is one of the most important causes of teat-end damage

Goal: ***To reduce over-milking of ewes and prevalence of teat-end damage***

Specific Remove the milking units from the ewe when milk flow ceases

Measurable Fewer than 10% of units are on for longer than 20 sec when milk flow ceases. Prevalence of teat end damage as evidenced by scabbing, scarring and raised rings around the teat end is less than 1 in 20 (5%) of teats

Fig. 1. Teat end damage



Achievable Requires operating fewer milking units per milker (an investment in labour), or the implementation of automatic take-offs (a financial investment)

Realistic This requires knowing the current level of over-milking (measure where currently at – have an assistant use a

stop-watch and record level of over-milking) and level of teat end damage from over-milking (again measure where currently at- at the end of one milking, have an assistant score the teat end lesions).

Timely Changes to proportion of sheep being over-milked can be done quite quickly with increased attention to unit removal and/or employing more labour in the parlour. Purchasing automatic take-offs may be delayed until sufficient funds can be found. Set a time-line for their purchase and installation. Regular monitoring of prevalence and severity of teat end lesions can be done once/month to track trends.

2. FREQUENCY OF MONITORING

2.1 DETECTION OF INFLAMMATION (SCC AND CMT)

As mentioned in Section II.5.3, detection of inflammation caused by mastitis pathogens is a useful way of monitoring for mastitis in the flock. Monitoring monthly for flock-level SCC values as part of the general milk-quality monitoring done by processors, usually will give the producer sufficient information on whether important changes have occurred. If this information is not provided by the processor, private laboratories or enrolment in the Can-West Dairy Herd Improvement program[1] can provide this information at the flock-level and individual animal level. CMT can be done at the same frequency or if clinical changes are noted and will provide immediate information at the individual sheep and gland level.

2.2 DETECTION OF MASTITIS PATHOGENS

Use of tests for SCC or CMT, will provide animals to screen for presence of mastitis pathogens. Bulk tank monitoring as covered in Section II.6 can be done monthly – although it is not as sensitive (i.e. finding all the infected sheep) as individual culture, but is more affordable.

In addition to monitoring bulk tank levels after each milk pick-up, daily monitoring of the consistency of milk during udder preparation is a convenient and successful way to monitor clinical cases of mastitis in the flock.

3. GOALS FOR BULK TANK SCC

The assessment of appropriate SCC levels in flocks is generally variable, as the range of SCC values can be drastic between flocks. On sheep flocks, bulk tank SCC (BTSCC) and bulk tank total bacterial counts have been highly correlated, with increases or decreases occurring at the same time. Therefore, it is important that along with monitoring infection status in flocks, good udder hygiene is an important goal on-farm.

Although it has been shown that SCC values for ewes can be significantly high, reaching over 1,500,000 cells/mL, ewes have the capability of maintaining a healthy SCC level of 200,000 cells/mL. Historically in sheep, a general threshold has been established to determine if a ewe's udder is healthy or not, of 400,000 cells/mL, however, implementing a goal of 200,000 cells/mL on-farm is certainly attainable, and something to strive for on-farm to aid in udder health, and overall milk production.

[1] http://www.canwestdhi.com/

4. IDEAL NUMBER OF CLINICAL CASES

In an ideal world, there would be no cases of clinical mastitis in dairy flocks; however, this is not a realistic goal on-farm, as there are many environmental and contagious factors that can affect udder health. As a rule, producers should aim for 5% or less of their flock that have cases of clinical mastitis on an annual basis. In terms of subclinical infections, less than 20-30% is a general goal to strive for, however, as previously mentioned, these infections are difficult to monitor on-farm without the use of SCC monitoring.

5. FREQUENCY OF INSPECTION OF EQUIPMENT

Maintenance of milking equipment is essential for ensuring that a quality milk product is being distributed for human consumption. Bulk tank temperature should be monitored after each milking to ensure that the tank is reaching its optimal temperature. On a weekly basis, areas of the milking equipment that are prone to residue build-up, such as the receiver jar or milking claws should be checked. This regular monitoring will decrease the chance of excessive amounts of residues, which could affect the bacterial counts in in the bulk tank. In addition, pre-rinse or wash water temperature should be monitored once a week to see if it is reaching the required temperature. On an annual basis, the entire milking system should be evaluated by a milking equipment dealer to see that all components are functioning properly.

6. TRACKING UDDER HEALTH AND SETTING GOALS

A form (Table VII.1) can be used to record cases of mastitis, findings from cultures and response to treatment. It should be kept in the office / records room in a binder. A form (Table VII.2) can be used to track udder health monitoring and record goal setting. It should be posted in the milk house or parlour and consulted often, particularly when SCC reports are received.

Table VII.1. Form to record culture results and treatments

DATE	EWE I.D.	GLAND (L / R)	SIGNS OF MASTITIS?[2]	TREATMENT HISTORY			SCC / CMT RESULTS	CULTURE RESULT[3]			TREATMENT PLAN	
				DATE	PRODUCT USED	# OF TIMES		BACTERIAL TYPE	GROWTH	ANTIBIOTIC SENSITIVITY	DATE	PRODUCT USED

[2] Record if ewe was ill (e.g. fever), the gland was abnormal (e.g. swollen, hot), the milk was abnormal (colour, consistency), or if mastitis was sub-clinical

[3] Results as provided from the diagnostic laboratory. Usually bacteria isolated are identified, the amount of growth (e.g. # colonies or 1+, 2+, etc.) and if requested, which antibiotics appear to kill the bacteria.

Table VII.2. Assessment of udder health in dairy sheep

DATE OF ASSESSMENT	MILKING SYSTEM	FARM NAME	FLOCK VETERINARIAN
Average # ewes milked in previous 12 months		**Avg. # days post-lambing ewes put into milk-line**	**Avg. length of lactation (milked)**

MEASUREMENT OF PERFORMANCE	PREVIOUS LEVEL	GOAL FOR FLOCK	CURRENT LEVEL	ACTION NEEDED?	ADDITIONAL ASSESSMENT
ASSESSMENT OF CLINICAL MASTITIS					
Annual incidence of clinical mastitis[i] (%) *Calculate: (# ewes with 1 or more cases of clinical mastitis[ii] in last 12 months / average # ewes milked in last 12 months) X 100*		**< 5%**		☐ YES ☐ NO	• Investigate stage of lactation, season, parity of animals with clinical mastitis • Culture cases to determine if contagious or environmental organisms • Review milking management, milking equipment
Annual incidence of repeat cases of clinical mastitis (%) *Calculate: (Total # cases of clinical mastitis in last 12 months / average # ewes milked in last 12 months) X 100*		**<1.5 X value above**		☐ YES ☐ NO	• Culture cases to determine organism. • Investigate reasons for failure to manage clinical cases (e.g. treatment protocols)
Prevalence of ewes with a blind gland (%) *Calculate: (Total # of glands that did not produce milk in the last 12 months/total # of ewes milked in last 12 months) X 100*		**< 5%**		☐ YES ☐ NO	• Examine history of ewes with blind glands to determine reason. E.g. mastitis, teat damage. • Review culling policy.
ASSESSMENT OF SUB-CLINICAL MASTITIS					
Proportion of ewes with SCC level > 400,000[iii] (linear score 5) each test (%) *Calculate: (# ewes with SCC > 400,000 at last milk test/# ewes tested) X 100*		**< 20%**		☐ YES ☐ NO	• Investigate stage of lactation, season, parity etc. of animals with subclinical mastitis • Review milking hygiene and maintenance of milking equipment • Review management of ewes with contagious mastitis • Review hygiene of environment • Determine prevalence of teat end lesions and their cause (e.g. over-milking, high vacuum) • Review biosecurity protocol when purchasing animals • Investigate risk from nursing lambs of teat damage
Incidence of new infections during lactation (%) *Calculate: (# ewes with SCC > 400,000 at last milk test and ≤ 400,000 at previous milk test/# ewes ≤ 400,000 at previous milk test) X 100*		**< 5%**		☐ YES ☐ NO	

MEASUREMENT OF PERFORMANCE	PREVIOUS LEVEL	GOAL FOR FLOCK	CURRENT LEVEL	ACTION NEEDED?	ADDITIONAL ASSESSMENT
Prevalence of chronic infections (%) *Calculate: (# ewes with SCC > 400,000 at 3 or more tests this lactation / total # lactations assessed) X 100*		**< 5%**		☐ YES ☐ NO	• Determine period of onset of chronic mastitis cases with respect to stage of lactation, parity, season • Culture to determine pathogen type • Investigate status of maedi visna infection in the flock
Prevalence of infections at first test post-lambing (%) *Calculate: (# ewes with SCC > 400,000 at first test post-lambing/total # first tests) X 100*		**< 10 %**		☐ YES ☐ NO	• Determine parity of affected animals • Investigate whether due to damage from nursing lambs prior to placing in milk line • Review dry-period mastitis treatment protocols and hygiene at treatment • Investigate dry-off management • Review environment of dry ewes
ANIMAL LOSS DUE TO MASTITIS					
Turnover rate due to mastitis (%) *Calculate: (# ewes culled and died due to mastitis/average # milked in last 12 months) X 100*		**< 5%**		☐ YES ☐ NO	• Review treatment protocols, including methods of detection of ewes with clinical mastitis • Investigate causative agents causing death (e.g. *Staphylococcus aureus*) • Investigate and review as outlined above under clinical and subclinical mastitis • Review culling policies as well as areas above
Incidence of ewes dying of mastitis annually (%) *Calculate: (# ewes dying of mastitis / avg. # milked in last 12 months) x 100*		**< 0.5%**		☐ YES ☐ NO	
Proportion of ewes culled due to mastitis (%) *Calculate: (# ewes culled due to mastitis / avg. # milked in last 12 months) X 100*		**< 5%**		☐ YES ☐ NO	
Proportion of ewes culled, that were culled due to mastitis (%) *Calculate: (# ewes culled due to mastitis / total # ewes culled[iv] in last 12 months)*		**< 20%**		☐ YES ☐ NO	

[i] A case of clinical mastitis is one in which there is a change to the udder and / or milk of one or more glands as detected by visual inspection
[ii] Count ewes with multiple cases of clinical mastitis only once.
[iii] You may wish to lower this cut-point as udder health improves and average flock SCC drops. A goal would be to use SCC > 200,000 (linear score 4)
[iv] Do not include ewes that were sold for dairy, i.e. into another flock to be milked, but only those ewes sent to slaughter

Mastitis Culture Results Form – Dairy Sheep

DATE	EWE I.D.	GLAND (L / R)	SIGNS OF MASTITIS?[1]	TREATMENT HISTORY			SCC / CMT RESULTS	CULTURE RESULT[2]			TREATMENT PLAN	
				DATE	PRODUCT USED	# OF TIMES		BACTERIAL TYPE	GROWTH	ANTIBIOTIC SENSITIVITY	DATE	PRODUCT USED

[1] Record if ewe was ill (e.g. fever), the gland was abnormal (e.g. swollen, hot), the milk was abnormal (colour, consistency), or if mastitis was sub-clinical

[2] Results as provided from the diagnostic laboratory. Usually bacteria isolated are identified, the amount of growth (e.g. # colonies or 1+, 2+, etc.) and if requested, which antibiotics appear to kill the bacteria.

Table VII.1 – A Guide to Udder Health for Dairy Sheep – November 2013

Assessment of Udder Health in Dairy Sheep

DATE OF ASSESSMENT	MILKING SYSTEM	FARM NAME	FLOCK VETERINARIAN

Average # ewes milked in previous 12 months	Avg. # days post-lambing ewes put into milk-line	Avg. length of lactation (milked)

MEASUREMENT OF PERFORMANCE	PREVIOUS LEVEL	GOAL FOR FLOCK	CURRENT LEVEL	ACTION NEEDED?	ADDITIONAL ASSESSMENT
ASSESSMENT OF CLINICAL MASTITIS					
Annual incidence of clinical mastitis[i] (%) *Calculate: (# ewes with 1 or more cases of clinical mastitis[ii] in last 12 months / average # ewes milked in last 12 months) X 100*		**< 5%**		☐ YES ☐ NO	• Investigate stage of lactation, season, parity of animals with clinical mastitis • Culture cases to determine if contagious or environmental organisms • Review milking management, milking equipment
Annual incidence of repeat cases of clinical mastitis (%) *Calculate: (Total # cases of clinical mastitis in last 12 months / average # ewes milked in last 12 months) X 100*		**<1.5 X value above**		☐ YES ☐ NO	• Culture cases to determine organism. • Investigate reasons for failure to manage clinical cases (e.g. treatment protocols)
Prevalence of ewes with a blind gland (%) *Calculate: (Total # of glands that did not produce milk in the last 12 months/total # of ewes milked in last 12 months) X 100*		**< 5%**		☐ YES ☐ NO	• Examine history of ewes with blind glands to determine reason. E.g. mastitis, teat damage. • Review culling policy.
ASSESSMENT OF SUB-CLINICAL MASTITIS					
Proportion of ewes with SCC level > 400,000[iii] (linear score 5) each test (%) *Calculate: (# ewes with SCC > 400,000 at last milk test/# ewes tested) X 100*		**< 20%**		☐ YES ☐ NO	• Investigate stage of lactation, season, parity etc. of animals with subclinical mastitis • Review milking hygiene and maintenance of milking equipment • Review management of ewes with contagious mastitis • Review hygiene of environment • Determine prevalence of teat end lesions and their cause (e.g. over-milking, high vacuum) • Review biosecurity protocol when purchasing animals • Investigate risk from nursing lambs of teat damage
Incidence of new infections during lactation (%) *Calculate: (# ewes with SCC > 400,000 at last milk test and ≤ 400,000 at previous milk test/# ewes ≤ 400,000 at previous milk test) X 100*		**< 5%**		☐ YES ☐ NO	

Table VII.2 – A Guide to Udder Health for Dairy Sheep – November, 2013

Assessment of Udder Health in Dairy Sheep

MEASUREMENT OF PERFORMANCE	PREVIOUS LEVEL	GOAL FOR FLOCK	CURRENT LEVEL	ACTION NEEDED?	ADDITIONAL ASSESSMENT
Prevalence of chronic infections (%) *Calculate: (# ewes with SCC > 400,000 at 3 or more tests this lactation / total # lactations assessed) X 100*		**< 5%**		☐ YES ☐ NO	• Determine period of onset of chronic mastitis cases with respect to stage of lactation, parity, season • Culture to determine pathogen type • Investigate status of maedi visna infection in the flock
Prevalence of infections at first test post-lambing (%) *Calculate: (# ewes with SCC > 400,000 at first test post-lambing/total # first tests) X 100*		**< 10 %**		☐ YES ☐ NO	• Determine parity of affected animals • Investigate whether due to damage from nursing lambs prior to placing in milk line • Review dry-period mastitis treatment protocols and hygiene at treatment • Investigate dry-off management • Review environment of dry ewes
ANIMAL LOSS DUE TO MASTITIS					
Turnover rate due to mastitis (%) *Calculate: (# ewes culled and died due to mastitis/average # milked in last 12 months) X 100*		**< 5%**		☐ YES ☐ NO	• Review treatment protocols, including methods of detection of ewes with clinical mastitis • Investigate causative agents causing death (e.g. *Staphylococcus aureus*) • Investigate and review as outlined above under clinical and subclinical mastitis • Review culling policies as well as areas above
Incidence of ewes dying of mastitis annually (%) *Calculate: (# ewes dying of mastitis / avg. # milked in last 12 months) x 100*		**< 0.5%**		☐ YES ☐ NO	
Proportion of ewes culled due to mastitis (%) *Calculate: (# ewes culled due to mastitis / avg. # milked in last 12 months) X 100*		**< 5%**		☐ YES ☐ NO	
Proportion of ewes culled, that were culled due to mastitis (%) *Calculate: (# ewes culled due to mastitis / total # ewes culled[iv] in last 12 months)*		**< 20%**		☐ YES ☐ NO	

[i] A case of clinical mastitis is one in which there is a change to the udder and / or milk of one or more glands as detected by visual inspection
[ii] Count ewes with multiple cases of clinical mastitis only once.
[iii] You may wish to lower this cut-point as udder health improves and average flock SCC drops. A goal would be to use SCC > 200,000 (linear score 4)
[iv] Do not include ewes that were sold for dairy, i.e. into another flock to be milked, but only those ewes sent to slaughter

Table VII.2 – A Guide to Udder Health for Dairy Sheep – November, 2013