

## **Master Thesis Business Economics**

### **General Information**

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**Title:** Preventive and Failure Costs of Mastitis in South-Africa

## **Preface**

With this thesis, there comes an end to three years of studying Management, Economics and Consumer studies. It has been a terrific time and I have had the privilege to study and work in the Netherlands, the U.S. and South Africa and learn from inspiring people. The challenge of writing a thesis has given me interesting insights in the interaction between the theoretical ideal world and the more resilient practice. My research shows that these two worlds should continue to keep in touch with each other to be able to understand each other. Only in this way meaningful and useful insights can be drawn.

I am grateful for all the help that I received during the research of this thesis. I am thankful to my supervisor Henk Hogeveen for the help with searching for an interesting subject and creating a research proposal. I would like to express my gratitude to the South African Milk Producers' Organisation for giving me and Nicolene Schlimmer the opportunity to do this project. I would like to thank Nicolene Schlimmer, our supervisor Martin Van Der Leek and other students and staff at Onderstepoort for having guided the development of this thesis for the past year and for offering me a challenging and rewarding three month experience in South Africa. I am very grateful to all the farmers that took part in our survey and/or welcomed us on their farms. This thesis would never be possible without their collaboration. Last, I want to thank my girlfriend, Nonae Sripanwong for all her love and support.

## Introduction

With an incidence rate of 20-50% (Hospido & Sonesson, 2005) mastitis is the most prevalent production disease on high-productive dairy farms worldwide (Seegers et al., 2003). Because of the difficulty in controlling environmental mastitis organisms, mastitis will maintain this role in the foreseeable future (DeGraves & Fetrow, 1993). Mastitis has large negative impacts on animal welfare (Siivonen et al., 2011) and the environment (Hospido & Sonesson, 2005). Next to this, mastitis has a large economic impact on the dairy industry, at the processors level as well as at the production level (Doherr et al., 2007). Milk processors are mainly affected by a reduction in milk quality. Milk from mastitis affected cows suffers from casein depression which makes cheese production difficult, as well as a lower lactose content and elevated mineral level which gives the milk a specific salted taste (Şonea et al., 2009; Ogola et al., 2007).

For dairy farmers the economic losses are even higher. Mastitis is a very complicated disease with over 100 associated risk factors (e.g. barn type, size of cubicle, material of cubicle floor, bedding material, replacement, use of pastures, milking frequency, udder sanitation, stripping procedure, post-milking teat dipping, use of milkers' gloves, antibiotic dry cow therapy, metabolic diseases, breed, age and size of herd, body condition score, weight, ease of milking) (e.g., Doherr et al., 2007; Elbers et al., 1998; Peeler et al., 2000; Waage et al., 1998). Since there are so many mastitis prevention measures available for the dairy farmer, the majority of the economic studies have limited their research to the costs of the consequences of the disease (production losses, treatment costs of clinical cases, replacement of culled cows). Although these studies have value in identifying the failure costs of mastitis, they do not provide the total costs of mastitis. The dairy farmer also invests time and money on mastitis prevention. To maximize its profit he is interested in minimizing the total mastitis costs and not in minimizing the costs of the consequences of the disease. A limited amount of studies have been done where a partial budget for a specific prevention measure has been calculated (e.g. E. coli J5 vaccine (DeGraves & Fetrow, 1991)), but even this is not very accurate since effects of certain preventive measure can depend on other implemented preventive measures.

Hogeveen et al. (2011) did a research to the TC of both clinical and subclinical mastitis in the Netherlands and suggested to make a distinction between failure costs (FC), costs associated with cows suffering from mastitis and preventive costs (PC), costs associated with mastitis prevention. They found that FC varied between € 17 and € 198 per cow-year. In theory, FC and PC share a downward substitution relationship: the higher the mastitis prevention costs for mastitis, the lower the failure costs and vice versa. There is an economic optimum at the point where an additional amount of money spent on mastitis prevention returns a reduction in failure costs of the same size. So knowing where he is on the FC-PC substitution curve and knowing which not implemented preventive measures still have opportunities to reduce his

total mastitis costs are very important for a dairy farmer to be able to make the right decisions. Yet little is known about PC of mastitis.

Van Soest et al. (2015) were the first to work further on this concept and estimated the TC of mastitis at on average € 220 per cow-year, of which € 96 per cow-year FC and € 124 per cow-year PC. Lowest attainable FC were estimated at € 24 per cow-year and lowest attainable TC were estimated at € 103 per cow-year. This means most of the FC are avoidable which opens up a large opportunity for improvements in mastitis management. For the dairy farmer to be able to make the right decisions he should have information about the additional PC and reduced FC of alternative mastitis prevention measures. More studies on the concept of optimizing FC and PC in mastitis management are not known.

In South Africa the average herd size is currently above 300 cows and is growing year after year (Coetzee, 2012). With the commercialisation of dairy farms, achieving high production efficiency is getting more and more important. Reducing total mastitis costs is part of this job. Due to the differences (e.g. climate) between South Africa and countries wherefore a lot of research on the FC of mastitis is done (EU, US) accurate values for FC in South Africa are unknown. For PC it's even harder to make a good estimation since only very limited research on PC has been performed. For the South African dairy farmers to be able to make correct decisions concerning mastitis prevention, more information about the additional PC and reduced FC of the most common mastitis prevention measures is necessary.

The aim of this research is to obtain further insight in the FC-PC relation of mastitis by making accurate estimations of the FC-PC frontier for South African dairy farms. This information can help South African dairy farmers position themselves on the frontier and accordingly take the right mastitis prevention and treatment decisions.

In this study the answers to the following questions are searched:

What is the incidence rate of mastitis on South African dairy farms?

What are the average preventive and failure costs of mastitis on South African dairy farms and how do they relate?

Which mastitis preventive measures should South African farmers implement to maximize their profit?

## Material and methods

This research is part of a bigger research project of the University of Pretoria and Milk SA, the governing body of the South-African Milk Producers' Organisation (MPO), who represents over 95% of the dairy farmers in South Africa. The bigger research project focuses on resistance to the available antibiotics in lactating cows. The main information source for this mastitis project was a survey sent electronically to 1700 members of the MPO. The survey was built and sent out using Surveygizmo (Boulder CO, USA). The questions of the survey used in the research on risk factors for udder health on AMS farms (Heinen, 2008) was used as a base for building up the survey. The survey assessed the current state of the art regarding mastitis prevention and treatment programs, including economic questions on the failure and prevention costs.

It consists of 3 parts: general farm information, cow factors and the environment. The general part contains 31 questions about the used breed, the number of cows, the annual milk production, the number of employees, the type of feeding system. The part of the survey about cow factors contains 51 questions about mastitis and mastitis control such as, udder clipping/flaming, tail switching/docking, the number of clinical mastitis cases, the bulk milk somatic cell count (BMSCC), the frequency of routine herd sampling for SCC and experienced disease outbreaks. The environmental part focused on the cows' day-to-day environment and contains 41 questions about, for instance, the housing (bedding material, type and amount of fresh material in cubicles, overcrowding), the milking parlour (type, age, frequency of cleaning and maintenance) and the employees (training, milking routine, standard operating procedures (SOPs), mastitis detection). Where applicable, also price levels (for instance for milk and feed) and costs (for instance for mastitis control measures) were asked. All the questions can be found in the appendix. Most of them were closed-ended and it took around half an hour for the farmers to fill in the survey. To make sure the survey was designed well and did not contain ambiguous or sensitive questions the survey was pretested on 20 farmers before the survey was sent to the 1700 members of the MPO. 1 week after the survey was sent out to the MPO members, reminders were sent out and participants that didn't fill in the survey completely were asked for a completion in a follow up survey with their missing questions. 147 MPO-members participated in the survey (a response rate of 8 %). Not all answers were 100% complete. Participants with incomplete surveys were reminded 3 times to answer the missing parts of the survey.

Because we were interested in the economics of mastitis, only data from farms that gave us complete information about their milking routine (the use of gloves, pre-dip, strip, udder wash, post-dip, backflush) and at least one of the following major components related to the failure costs of mastitis: bulk somatic cell count, monthly mastitis cases and/or mastitis cull data was taken into account. 62 farms did not provide this data and were taken out of our dataset, leaving a semi-complete dataset with data from 85 farms. In case some minor

information was missing for a farm, the value of the missing variables was assumed to be equal to the average of the other farms in the dataset. Only questions related to the economics of mastitis (question nr. 4, 9, 12, 21, 23, 29, 86, 89, 101-105, 109, see Appendix) were used to calculate the total costs of mastitis.

Due to the large variety in climate in South Africa, farmers were grouped by area: The East Cape, West Cape, Kwazulu-Natal and a Central area covering the other provinces. To verify the responses of the dairy farmers and gain a better insight in the South African dairy industry 5 farmers (who participated in the survey) of each area were randomly selected and visited. For every area computer generated random numbers were assigned to each farm in that area and sorted in order of these numbers. For every area the first 5 farms on this list were visited. On these farm visits mastitis prevention and treatment measures were thoroughly reviewed: milking routine and treatments were observed, general health of the herd and organisation of the farm were graded, survey results were confirmed and missing information was completed. At the end 20 non-respondents (5 from each area) were called and asked some basic farm and mastitis prevention questions. This data was compared with the survey data.

The results of the survey and farm visits were analysed in Excel. In cases detailed information about other variables was missing for a specific farm, values for these variables were assumed to be equal to the other farms. For every farm in our model all preventive and failure costs were calculated, as well as their total preventive and failure costs.

Drying off, liner replacement, the usage of milking gloves, the usage of predip and postdip were considered to be the major preventive measures farmers in South Africa take. Calculations for these preventive measures can be found below.

Costs of drying off are estimated as:

$$C_{dry} = (P_a + P_s) * 4$$

Where:

- $C_{dry}$  = costs of drying off cows in ZAR per cow per year
- $P_a$  = price of antibiotic drying off tube (in ZAR per tube)
- $P_s$  = price of sealant (in ZAR per tube)

Costs of liner replacement are estimated as:

$$C_{liner} = 365 * 2 * L * P_l * 4$$

Where:

- $C_{liner}$  = Costs of liner replacement in ZAR per cow per year
- $L$  = liner replacement interval (cows milked before liners are replaced)
- $P_l$  = liner price (in ZAR per liner)

Costs of milking gloves are estimated as:

$$C_{gloves} = G * P_g$$

- $C_{gloves}$  = Costs of using milking gloves in ZAR per cow per year
- $G$  = pairs of gloves used per cow per year
- $P_g$  = price of gloves (in ZAR per pair)

Predip costs are estimated as:

$$C_{predip} = 365 * \frac{2}{1000} * P_{pre} * U_{pre}$$

- $C_{predip}$  = Predipping costs in ZAR per cow per year
- $P_{pre}$  = price of predip in ZAR per liter
- $U_{pre}$  = predip usage in ml per cow per milking

Postdip costs are estimated as:

$$C_{postdip} = 365 * \frac{2}{1000} * P_{post} * U_{post}$$

- $C_{postdip}$  = Postdipping costs in ZAR per cow per year
- $P_{post}$  = price of postdip in ZAR per liter
- $U_{post}$  = postdip usage in ml per cow per milking

Total Preventive costs are estimated as the sum of all these 'costs':

$$PC = C_{dry} + C_{liner} + C_{gloves} + C_{predip} + C_{postdip}$$

The paper ‘Economic aspects of mastitis: new developments’ from Hogeveen et al (2011) was used as the conceptual framework to calculate the failure costs. Major failure costs were assumed to be milk losses due to subclinical mastitis, treatment costs of clinical cases, milk discardments of clinical cases and culls due to either subclinical or clinical mastitis. Costs for these measures can be found below.

The cost of subclinical mastitis milk losses are calculated using Hortet and Seegers’ review (1998):

$$C_{sub} = 305 * \left\{ \left( P * \frac{\log\left(\frac{SCC}{50000}\right)}{\log(2)} * 0.4 \right) + \left( (1 - P) * \frac{\log\left(\frac{SCC}{50000}\right)}{\log(2)} * 0.6 \right) \right\} * (M - 0.5 * F)$$

Where :

- $C_{sub}$  = costs of subclinical mastitis milk losses in ZAR per cow per year
- $P$  = % primiparous cows
- $SCC$  = 12 – month average bulk somatic celcount  $\left(in \frac{cells}{ml}\right)$
- $M$  = milk price (in ZAR per kg milk)
- $F$  = feed price (in ZAR per kg DM)

Treatment costs are estimated as:

$$C_{treatment} = C * P_t * n_t$$

Where:

- $C_{treatment}$  = treatment costs of clinical mastitis cases in ZAR per cow per year
- $C$  = clinical mastitis cases per cow per year
- $P_t$  = treatment price in ZAR per treatment
- $n_t$  = number of times a clinical case is on average treated

The cost associated with antibiotic/mastitis milk discardments is estimated as:

$$C_{discardments} = M * D * S * X$$

Where:

- $M$  = milk price (in ZAR per kg milk)
- $D$  = daily milk production (in kg milk per cow per day)
- $S$  = amount of days that milk from clinical cases is on average separated from the bulk tank
- $X$  = 0 if antibiotic/mastitis milk is not discarded, 1 if the milk is discarded



Assuming the difference between replacement costs for a culled cow and its culling value is 5000 ZAR, the costs associated with the culling of mastitis cows is estimated as:

$$C_{\text{cull}} = Y * 5000$$

Where:

- $C_{\text{cull}}$  = the net costs of culling mastitis cows in ZAR per cow per year
- $Y$  = mastitis cull rate

Failure costs of mastitis can then be calculated as:

$$FC = C_{\text{sub}} + C_{\text{treatment}} + C_{\text{discardments}} + C_{\text{cull}}$$

For every cost component an average and standard deviation was calculated of all the available data points. Because of the large variability in farm sizes and farm systems averages of these 'costs' were also calculated for different farm sizes and farm systems (grazing vs TMR). A multivariate regression analysis was performed to see which preventive measures have a significant positive and a negative influence on the total costs of mastitis. 5 major preventive costs (costs of drying off, liner replacement costs, cost of gloves, predip costs, postdip costs) were used as independent variables to predict the total (TC) and failure costs of mastitis (FC). Since some prevention measures might also positively affect subclinical and clinical mastitis (e.g. due to incorrect implementation of the prevention measure i.e. drying off with dirty teat ends, using dirty dip cups etc.) we don't assume beforehand the relationship will be either positive or negative. Our null hypothesis states that there is no relationship between the prevention measures and the failure or total costs of mastitis (regression coefficient equals 0), the alternative hypothesis states that there is a relationship (regression coefficient is not equal to 0). We use a P-value of 0.05 for this test.

The following assumptions were made:

- 1) Cows are milked twice a day on all farms. Even when some farms milk their cows 3 times a day, we calculate everything as they were milking 2 times a day to be able to make costs comparable (e.g. a 2500 milking milk liner replacement will be more expensive on a 3x/day milking strategy than with a 2x/day milking strategy even when the liner quality would on average be the same). This does over/underestimate real costs but lets us compare better between farms how much is done to prevent mastitis.
- 2) Liners are only replaced to prevent mastitis, not to ensure a better milk quality. 100% of the liner replacement costs are counted towards mastitis prevention costs.
- 3) The difference between replacement costs for a culled mastitis cow and its culling value is 5000 ZAR.
- 4) Per kg of milk lost due to subclinical mastitis, 0.5 kg dry matter feed is consumed less.
- 5) Farmers are not paid any price incentive for delivering low SCC milk.
- 6) Milk production level was considered constant throughout the lactation.
- 7) Due to the relatively low labor costs in South Africa, labor is not accounted for in this research; products are the main costs here, not the work.
- 8) SCC is assumed to be independent from lactation number or lactation stadium
- 9) Every cow calves exactly once every 365 days
- 10) Before cows get mastitis their milk production is on average not higher or lower than the herd average.

## Results

The average incidence rate of mastitis in our study was 30.7 %. 61.1 % of these mastitis cases were diagnosed in cows in 3<sup>rd</sup> lactation or higher (table 1). Other non-economic variables and prices of used mastitis prevention products can be found in table 2 and 3

**Table 1: Mastitis incidence and cull rate on South African farms**

	Average	St.dev.
Mastitis cases per cow per year	30.7 %	25.8 %
• By lactation nr.		
▪ 1 <sup>st</sup> lactation	10.5 %	10.0 %
▪ 2 <sup>nd</sup> lactation	27.3 %	23.1 %
▪ 3 <sup>rd</sup> lactation and higher	61.1 %	24.6 %
• By lactation stage		
▪ < 90 days in milk	29.0 %	20.8 %
▪ 90-300 days	44.1 %	25.9 %
▪ > 300 days in milk	37.9 %	22.7 %
Total cull rate	25.5 %	8.5 %
Mastitis cull rate	5.96 %	5.93 %

**Table 2: Averages for other variables**

liner replacement interval (milkings)	3835
Average time treated per case	3.3
Frequency of treatments (% twice a day or more frequent)	61.9
Bulk Somatic Cell Count (cells/ $\mu$ L)	291
Loss in milk production due to subclinical mastitis (L/cow/day)	
• 1 <sup>st</sup> lactation	1.05
• 2 <sup>nd</sup> lactation	1.57
Milk production (L/cow/day)	18.1
Duration of total withdrawal time of clinical mastitis cases (d)	7

**Table 3: Average product prices**

Product	Average price	St.dev.
Antibiotic dry cow therapy (R/tube)	23.4	11.0
Antibiotic lactating cow therapy (R/tube)	29.7	13.9
Liner (R/liner)	93.4	62.6
Gloves (R/100 gloves)	106	91.8
Predip (R/liter)*	35.4	20.0
Postdip R/liter)*	28.1	17.8
Feed (R/ton DM)	3995	917
Milksales (R/liter)	4.93	0.71

\*based on 20 farm visits

Our survey results showed a large variation in the implementation of different mastitis prevention strategies between South African farmers. The farm visits learned us that the quality and exact method (e.g. spray, dip or brush used to disinfect teats pre-milking) of certain implemented prevention measures also varied widely between the different farms; but because of the limited amount of farms visited and the difficulty to objectively quantify the quality of different prevention measures our research focussed on the implementation of prevention measures itself (Yes/No). Implementation rates of the most common mastitis prevention measures can be found in table 4. While drying of cows with antibiotics is very common (95 %) in South Africa, most farms don't use a teat sealant (35 %). Because of this we consider them both as 'drying-off costs when we talk about the economics'. Post-dipping, stripping and pre-dipping are milking routine measures implemented by most South African farmers, wiping, teat washing, the use of gloves and backflushing is less common. Stripping, wiping, teat washing and backflushing are labor intensive (low labor costs in South Africa) and don't require expensive resources (paper, soap for washing clothes, water ...). These costs are thus ignored in our economic analysis. Because only 11% of the farmers vaccinate against mastitis these costs are not taken into account in our economic analysis.

**Table 4: Implementation of different mastitis prevention measures (in % of farms that implemented the respective mastitis prevention measure)**

Drying off with antibiotics	95 %
Post-dipping	94 %
Discardment of mastitis milk	65 %
Stripping	64 %
Pre-dipping	57 %
Wiping	41 %
Teat Washing	40 %
Use of milkers gloves	37 %
Use of teat sealant at dry off	35 %
Backflushing	32 %
Vaccinating against mastitis	11 %

Table 5 describes the averages and standard deviations of major preventive and failure costs components. All values are presented in ZAR per cow per year (EUR/ZAR = 15.52, 31 July 2016). Preventive costs consisted of drying off, liner replacement, milking gloves, predip and postdip usage. Failure costs consisted of a milk loss due to subclinical mastitis, treatment costs of clinical cases, antibiotic milk discardments and mastitis culls. Since labor costs in South Africa are relatively low, labor costs were not taken into account. Costs of drying off consisted of the costs of drying off tubes and teat sealants. Milk losses due to subclinical mastitis were calculated per farm according to Hortet and Seegers (1998) using the long term bulk somatic cell count and the proportion of primiparous and multiparous cows. Per kg of lost milk production, a reduction in feed intake of 0.5 kg dry matter was assumed. Treatment costs

consisted only of the drugs used to treat clinical mastitis. Milk discardments are calculated based on the milk price, milk production and days the milk of treated cases is on average discarded. Costs of mastitis culls are estimated to be on average 5000 ZAR per cull (replacement cost – sale value). Average total mastitis costs were 1952 ZAR (s = 450 ZAR) of which 405 ZAR (s = 200 ZAR) preventive costs and 1547 ZAR (s = 426 ZAR) failure costs (Table 1). The largest contributor to these costs were the milk losses due to subclinical mastitis (1218 ZAR).

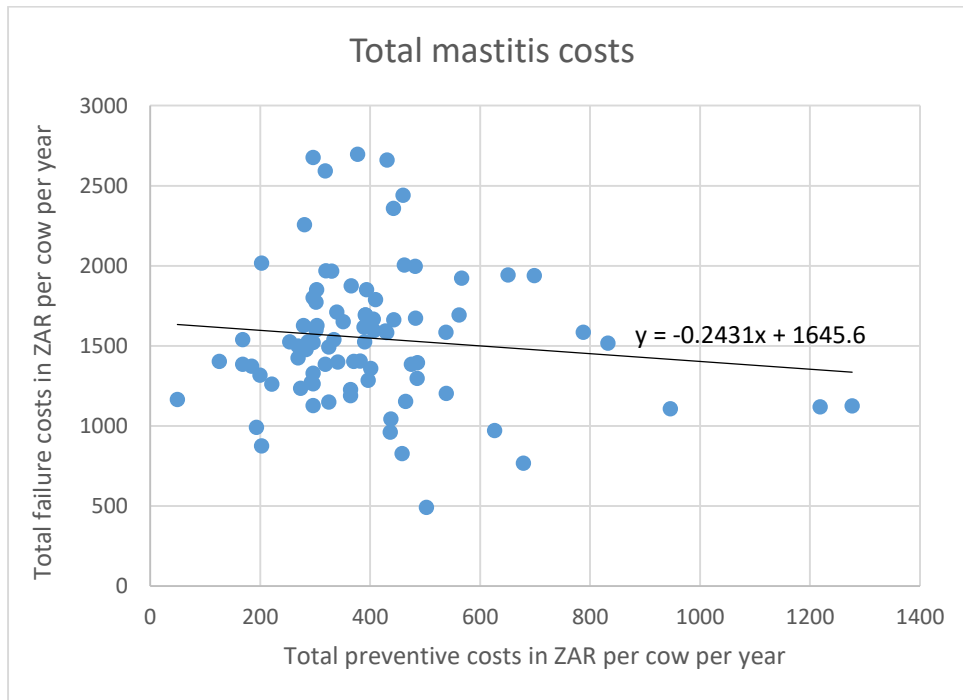
No significant ( $P < .05$ ) difference was found in the costs of mastitis between small ( $< 300$  cows) and larger ( $\geq 300$  cows) farms (Table 5). When comparing TMR versus pasture herds (Table 5), the only significant ( $P < .05$ ) difference was that the expense for predip was higher for TMR farms than pasture-based farms (Table 5). Average predip price wasn't significantly higher for TMR farms than for pasture-based farms but TMR farms significantly ( $P < .05$ ) predip their cows more than pasture-based farms.

**Table 5: Average mastitis costs and st. dev. in ZAR per cow per year on South-African dairies, distinction between small ( $< 300$  cows)/large ( $\geq 300$  cows), TMR/Grazing**

	Average (n = 85)	St. dev.	< 300 (n = 39)	$\geq 300$ (n = 46)	TMR (n = 33)	Grazing (n = 52)
<i>Total Preventive Costs</i>	405	200	429	385	462	369
Drying off	116	61	128	107	112	119
Liner replacement	87	47	83	91	92	84
Milking gloves	9	19	9	8	11	8
Predip usage	56	118	74	41	98	30
Postdip usage	137	114	135	138	150	128
<i>Total Failure Costs</i>	1547	426	1561	1536	1552	1544
Subcl. mastitis milk losses	1218	375	1225	1212	1235	1208
Treatment costs	31	30	27	34	29	32
Milk discardments	109	194	156	70	288	305
Mastitis culls	298	224	308	290	138	91
<b>Total Costs</b>	<b>1952</b>	<b>450</b>	<b>1989</b>	<b>1920</b>	<b>2014</b>	<b>1913</b>

An overview of the total PC and FC for each farm can be found in figure 1. A negative relationship between FC and PC can be seen, although this relationship is not significant ( $P < .05$ ).

**Figure 1: Relationship between mastitis prevention and failure costs on 85 South African dairies**



Not every farmer takes all mastitis prevention measures (Table 4). For the farmers not taking certain prevention measures their costs were entered as 0 ZAR per cow per year in our model. The average cost for specific measures (table 5) is thus pulled down by the farmers not taken these measures. Table 6 shows the average costs and standard deviation of these measures for the farms that really took the respective prevention measure.

**Table 6: Average costs and st. dev. in ZAR per cow per year on dairies where the respective measure is taken**

	Average	St. dev.
Drying off	122	57
Milking gloves	24	26
Predip usage	99	143
Postdip usage	145	112
Milk discardments	169	220

Using multivariate regression, no significant ( $P < .05$ ) effect could be found of specific prevention measures on the total mastitis costs (Table 7) or on the failure costs of mastitis (Table 8). For variables with  $P < .10$  a univariate regression analysis was performed. In these univariate analyses only the variable costs of drying off was positively correlated with the failure costs of mastitis ( $P = .041$ ). It's regression coefficient was 1.48 meaning for every extra ZAR spend on drying off cows total mastitis costs increase by 1.48 ZAR.

**Table 7: Regression coefficients for a regression with the total costs of mastitis**

Independent variable	Regression coefficient	P-value
Intercept	1538.2	0.000
Costs of drying off	1.48	0.057
Liner replacement costs	0.85	0.415
Costs of gloves	3.48	0.182
Predip costs	0.39	0.362
Postdip costs	0.84	0.059

**Table 8: Regression coefficients for a regression with the failure costs of mastitis**

Independent variable	Regression coefficient	P-value
Intercept	1538.2	0.000
Costs of drying off	0.48	0.532
Liner replacement costs	-0.15	0.888
Costs of gloves	2.48	0.340
Predip costs	-0.61	0.162
Postdip costs	-0.16	0.715

The average size of the 20 questioned non-respondents was 534 cows; their mastitis incidence rate was 32.67 % a year. No major differences were found when comparing this data to the dataset of the survey participants.

## Discussion

With an economic damage of, on average, 1952 ZAR per cow per year, mastitis is a major cost component on South African dairy farms. We found a negative relationship between preventive and failure costs of mastitis, but due to the limited scale of this study no significant ( $P < .05$ ) relationship was found. Looking into the relationship between specific mastitis prevention measures and the total mastitis costs we found that there is a positive relationship between the amount of money spent on antibiotic drying off tubes and/or sealants and the total costs of mastitis. Farm size, region or farm type don't seem to influence the total mastitis costs as much as the specific farm management decisions do, although a larger study consisting of more farms could give us more insight into what really determines prevention and failure costs on South African dairies. Since the variation in FC between the different farms was large, there is a lot of room for improving the taken preventive measures on some farms. Future challenges lie in figuring out which preventive measures really reduce the total costs of mastitis and exploring how farmers can be supported and motivated to improve their prevention practices. This would directly benefit the members of the MPO.

The incidence rate of mastitis of 30.7% we found in this study lies in the range of 20 – 50% found by Hospido & Sonesson (2005). Average total mastitis costs found in this study were 1952 ZAR (126 EUR) per cow per year, consisting of 1547 ZAR (100 EUR) FC per cow per year and 405 ZAR (26 EUR) PC per cow per year. Several studies have looked into the FC of mastitis. Heikkilä et al. (2012) estimated the FC of mastitis at 147 EUR per cow per year for Holsteins and 121 EUR per cow per year for Ayrshires. Huijps et al. found FC varying from 65 EUR to 182 EUR per cow per year depending on the bulk SCC. These numbers are close to the 100 EUR per cow per year we found. Since very limited work has been published on the preventive and total costs of mastitis, it is hard to compare these numbers with other studies. Van Soest et al. (2015) is the only comparable study that not only took into account the failure, but also the preventive costs of mastitis. They estimated total costs of mastitis at 240 EUR/lactating cow per year, in which FC contributed 120 EUR/lactating cow per year and PC contributed another 120 EUR/lactating cow per year. Assuming 10% dry cows of total cows this study comes to 140 EUR/ lactating cow per year of which FC contributed 111 EUR /lactating cow per year and PC contributed 29 EUR/lactating cow per year. There is no major difference between failure costs of mastitis in the Netherlands and South Africa (120 VS 111 EUR/lactating cow per year). The large difference in preventive costs (120 VS 29 EUR/lactating cow per year) can be explained by the high labor costs in the Netherlands. Labor costs account for 82 of the 120 EUR PC in the Netherlands (Van Soest et al., 2015). Due to the low labor costs in South Africa, these costs were ignored in our study. Since wages in South Africa are on average 20 times lower than in the Netherlands (1 EUR/hr versus 20 EUR/hr) we don't expect the ignored labor costs to be more than 5 EUR per cow per year.



This study looked to the relationship between mastitis prevention and on farm economics, although more benefits of mastitis prevention might be felt further down the supply chain. Many discussed mastitis prevention measures (e.g. pre-dipping) reduce somatic cell count as well as bacteria count of the milk. Although most dairy farms in South Africa are not financially rewarded to further reduce these numbers, it might create extra value for the milk processors.

### **Conclusion**

With an incidence rate of 30.7%, mastitis is a major production disease in South Africa with a large economic impact. Average total mastitis costs found in this study were 1952 ZAR per cow per year, consisting of 1547 ZAR FC per cow per year and 405 ZAR PC per cow per year. The large variation in failure costs between the different farms, shows us that there are still opportunities for improving mastitis prevention measures. There is a positive relationship between the amount of money spent on antibiotic drying off tubes and/or sealants and the total costs of mastitis. No relationships between other prevention measures and FC/TC could be found.

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## **Appendix**

### **1) Owner & Dairy Information**

First Name\*: \_\_\_\_\_

Last Name\*: \_\_\_\_\_

Closest city/town\*: \_\_\_\_\_

#### **Province**

- ☐ Gauteng
- ☐ Limpopo
- ☐ North West
- ☐ Mpumalanga
- ☐ Free State
- ☐ KwaZulu-Natal
- ☐ Northern Cape
- ☐ Eastern Cape
- ☐ Western Cape

#### **Highest level of education:**

- ☐ Primary School
- ☐ High School
- ☐ College
- ☐ University
- ☐ Other

#### **Age:**

- ☐ Under 20
- ☐ 21-30
- ☐ 31-40
- ☐ 41-50
- ☐ 51-60
- ☐ Over 60

### **2) Given the same level of profit, what is your management style?**

- ☐ High input, higher production
- ☐ Low input, lower production
- ☐ Other:: \_\_\_\_\_

### **3) OWNER & DAIRY INFORMATION**

FIRST NAME\*: \_\_\_\_\_

LAST NAME\*: \_\_\_\_\_

CLOSEST CITY/TOWN\*: \_\_\_\_\_

**4) PROVINCE**

- ☐ GAUTENG
- ☐ LIMPOPO
- ☐ NORTH WEST
- ☐ MPUMALANGA
- ☐ FREE STATE
- ☐ KWAZULU-NATAL
- ☐ NORTHERN CAPE
- ☐ EASTERN CAPE
- ☐ WESTERN CAPE

**HIGHEST LEVEL OF EDUCATION:**

- ☐ PRIMARY SCHOOL
- ☐ HIGH SCHOOL
- ☐ COLLEGE
- ☐ UNIVERSITY
- ☐ OTHER

**AGE:**

- ☐ UNDER 20
- ☐ 21-30
- ☐ 31-40
- ☐ 41-50
- ☐ 51-60
- ☐ OVER 60

**5) GIVEN THE SAME LEVEL OF PROFIT, WHAT IS YOUR MANAGEMENT STYLE?**

- ☐ HIGH INPUT, HIGHER PRODUCTION
- ☐ LOW INPUT, LOWER PRODUCTION
- ☐ OTHER:: \_\_\_\_\_

**6) NEW RADIO BUTTONS**

- ☐ OPTION 1
- ☐ OPTION 2

---

**GENERAL**

**7) WHAT BREED(S) DO YOU MILK?**

(YOU MAY SELECT MORE THAN ONE BREED)

- ☐ HOLSTEIN FRIESLAND
- ☐ JERSEY
- ☐ AYRSHIRE
- ☐ BROWN SWISS
- ☐ GUERNSEY
- ☐ OTHER:: \_\_\_\_\_

**8) NUMBER OF COWS THAT ARE CURRENTLY:**

IN MILK (INCLUDING HOSPITAL COWS):

---

DRY (INCLUDING NON-PREGNANT COWS):

---

NUMBER OF HEIFERS FROM BIRTH AND PRIOR TO FIRST CALVING:

---

**9) IS YOUR FEEDING/MANAGEMENT SYSTEM PASTURE OR TOTAL MIXED RATION (TMR) BASED?**

☐ PASTURE BASED

☐ TMR

☐ COMBINATION

**LOGIC: SHOW/HIDE TRIGGER EXISTS.**

**10) DO YOU PRACTICE SEASONAL MILKING (EVEN IF TMR BASED)?**

☐ YES

☐ NO

**LOGIC: HIDDEN UNLESS: QUESTION "DO YOU PRACTICE SEASONAL MILKING (EVEN IF TMR BASED)?" #10 IS ONE OF THE FOLLOWING ANSWERS ("YES")**

**IN WHAT MONTH DO THE MAJORITY OF YOUR CALVINGS OCCUR?**

☐ JANUARY

☐ FEBRUARY

☐ MARCH

☐ APRIL

☐ MAY

☐ JUNE

☐ JULY

☐ AUGUST

☐ SEPTEMBER

☐ OCTOBER

☐ NOVEMBER

☐ DECEMBER

**11) WHAT IS THE CURRENT AVERAGE DAYS IN MILK (DIM) FOR YOUR LACTATING HERD?**

---

**12) What is the current milk price?**

---

**13) What was your milk price for August 2016?**

---

**14) Who is your milk buyer?**

☐ Clover

- ☐ Parmalat
- ☐ Nestle
- ☐ Woodlands
- ☐ Fairfield
- ☐ Lancewood
- ☐ Milkwood
- ☐ Orange Grove
- ☐ Coega Dairy
- ☐ Douglasdale
- ☐ Other:: \_\_\_\_\_

**15) What is your break-even milk production? (Don't include service of debt)**

\_\_\_\_\_

**16) What is your cost of production? (Don't include service of debt)**

\_\_\_\_\_

**17) Do you get paid any premiums for your milk?**

(You may select more than one)

- ☐ SCC
- ☐ Fat
- ☐ Protein
- ☐ Bacteria
- ☐ No premium

**18) Do you pay any milk price penalties for your milk?**

(You may select more than one)

- ☐ SCC
- ☐ Bacteria
- ☐ No penalties

**19) How many cows are you currently milking by lactation?**

	1st	2nd	3 +
Lactation	<div>_____</div> <div>_____</div> <div>_____</div>	<div>_____</div> <div>_____</div> <div>_____</div>	<div>_____</div> <div>_____</div> <div>_____</div>

**20) How many cows are you currently milking by stage of lactation?**

	Less than 90 DIM	90 to 300 DIM	Greater than 300 DIM
Lactation	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>

**21) How many times per day do you milk your cows?**

(Check all that apply)

☐ Once a day☐ Twice a day☐ Three times a day☐ Other:: \_\_\_\_\_**22) What is the duration of your average milking shift?**

\_\_\_\_\_

**23) What is your current daily average milk production? (kg/cow/day)**

\_\_\_\_\_

**24) What is the current herd average fat and protein percentage:**

Fat %: \_\_\_\_\_

Protein %: \_\_\_\_\_

**25) What is your monthly average milk production, fat and protein percentage from April 2015 - March 2016? (Original survey period)**

	Kg/cow/day	Fat %	Protein %
March 2016	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>
February 2016	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>
January 2016	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>
December	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>



r 2015			
Nov ember r 2015	_____ _____ _____	_____ _____ _____	_____ _____ _____
Octo ber 2015	_____ _____ _____	_____ _____ _____	_____ _____ _____
Sept emb er 2015	_____ _____ _____	_____ _____ _____	_____ _____ _____
Augu st 2015	_____ _____ _____	_____ _____ _____	_____ _____ _____
July 2015	_____ _____ _____	_____ _____ _____	_____ _____ _____
June 2015	_____ _____ _____	_____ _____ _____	_____ _____ _____
May 2015	_____ _____ _____	_____ _____ _____	_____ _____ _____
April 2015	_____ _____ _____	_____ _____ _____	_____ _____ _____

**Logic: Show/hide trigger exists.**

**26) What method of herd record keeping do you use?**

- ☐ Software program
- ☐ Dairy management wheel
- ☐ Paper
- ☐ Memory

**Logic: Hidden unless: Question "What method of herd record keeping do you use?" #26 is one of the following answers ("Software program")**

**What software program do you use?**

- ☐ ALPRO (Delaval)
- ☐ Waikato SA
- ☐ Milkfriend
- ☐ DIMSSA
- ☐ Smartherd
- ☐ Plan-A-Herd
- ☐ Afikim
- ☐ Other:: \_\_\_\_\_

**27) How are your lactating cows grouped?**

(You may select more than one)

- ☐ Lactation number
- ☐ Pregnancy status
- ☐ Days in milk
- ☐ Milk production
- ☐ No grouping
- ☐ Other (eg. milking time, SCC, etc):: \_\_\_\_\_

**Logic: Show/hidden trigger exists.**

**28) Which of the following management groups do you have?**

(You may select more than one)

- ☐ Just calved cows kept separate from milk cows, hospital cows and mastitis cows
- ☐ Mastitis cows kept separate from milk cows, hospital cows and just calved cows
- ☐ Mastitis cows kept with hospital and/or just calved cows
- ☐ High somatic cell count (SCC) cows
- ☐ Dry and steam up cows kept in one group
- ☐ Dry and steam up cows in separate groups
- ☐ Comment/Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "Which of the following management groups do you have?" #28 is one of the following answers ("Dry and steam up cows in separate groups")**

**Are steam up heifers grouped with the steam up cows?**

- ☐ Yes
- ☐ No, grouped separately

Logic: Hidden unless: Question "Which of the following management groups do you have?" #28 is one of the following answers ("Dry and steam up cows kept in one group", "Dry and steam up cows in separate groups")

Are cows and heifers in the steam up group for the same amount of time?

☐ Yes

☐ No, with the number of steam up days for heifers::

Logic: Hidden unless: Question "Which of the following management groups do you have?" #28 is one of the following answers ("Dry and steam up cows kept in one group", "Dry and steam up cows in separate groups")

What is the duration of the dry period?

	Days
Your target	<hr/>
Current	<hr/>

Logic: Hidden unless: Question "Which of the following management groups do you have?" #28 is one of the following answers ("Dry and steam up cows in separate groups")

What is the duration of the steam up period for cows?

	Days
Target	<hr/>
Current	<hr/>

Logic: Show/hide trigger exists.

29) Do you treat cows with an intramammary antibiotic treatment at the end of their lactation when drying up?

☐ Yes

☐ No

Logic: Hidden unless: Question "Do you treat cows with an intramammary antibiotic treatment at the end of their lactation when drying up?" #29 is one of the following answers ("Yes")

What type of medication do you use?

☐ Dry cow therapy

☐ Lactating cow therapy

( ) Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "Do you treat cows with an intramammary antibiotic treatment at the end of their lactation when drying up?" #29 is one of the following answers ("Yes")**

**Who physically administers the dry cow treatment?**

(Check all that apply)

- ☐ Owner
- ☐ Manager
- ☐ Employees
- ☐ Other e.g. veterinarian

**Logic: Hidden unless: Question "Do you treat cows with an intramammary antibiotic treatment at the end of their lactation when drying up?" #29 is one of the following answers ("Yes")**

**What intramammary antibiotic dry cow treatment do you use?**

**Current** product brand name: \_\_\_\_\_

Duration of use (months): \_\_\_\_\_

Price (Rand per tube): \_\_\_\_\_

**Previous or alternate** product brand name:

\_\_\_\_\_

Duration of use (months): \_\_\_\_\_

Price (Rand per tube): \_\_\_\_\_

**30) Are cows dried off suddenly or gradually?**

- ☐ Gradual
- ☐ Sudden

**31) Where do your cows calve predominantly?**

- ☐ Pasture
- ☐ Outside steam up pen / paddock
- ☐ Maternity area with dirt floor
- ☐ Purposely built maternity area with concrete floor
- ☐ Other:: \_\_\_\_\_

### 32) Body Condition Score

Please indicate in which range the average BCS of these groups of cows fall:

	Good	Average	Poor
Lactating Cows	( )	( )	( )
Steam Up Cows	( )	( )	( )
Dry Cows	( )	( )	( )

Please give an estimate (number) for the average BCS of each group of cows:

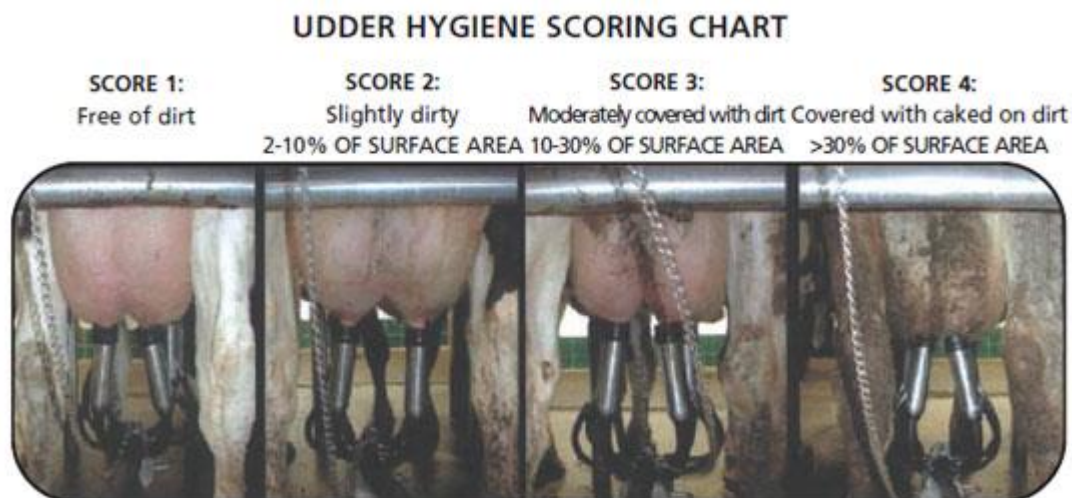
Lactating Cows:: \_\_\_\_\_

Steam Up Cows:: \_\_\_\_\_

Dry Cows:: \_\_\_\_\_

### 33) There is an association between udder cleanliness and udder health/milk quality.

( ) udderclean1.jpg



Source: Milk Money Programme, UW-Madison

On average, what percentage of cows can be classified under each group according to the image above?

(Column to add up to 100%)

\_\_\_\_\_ Group 1

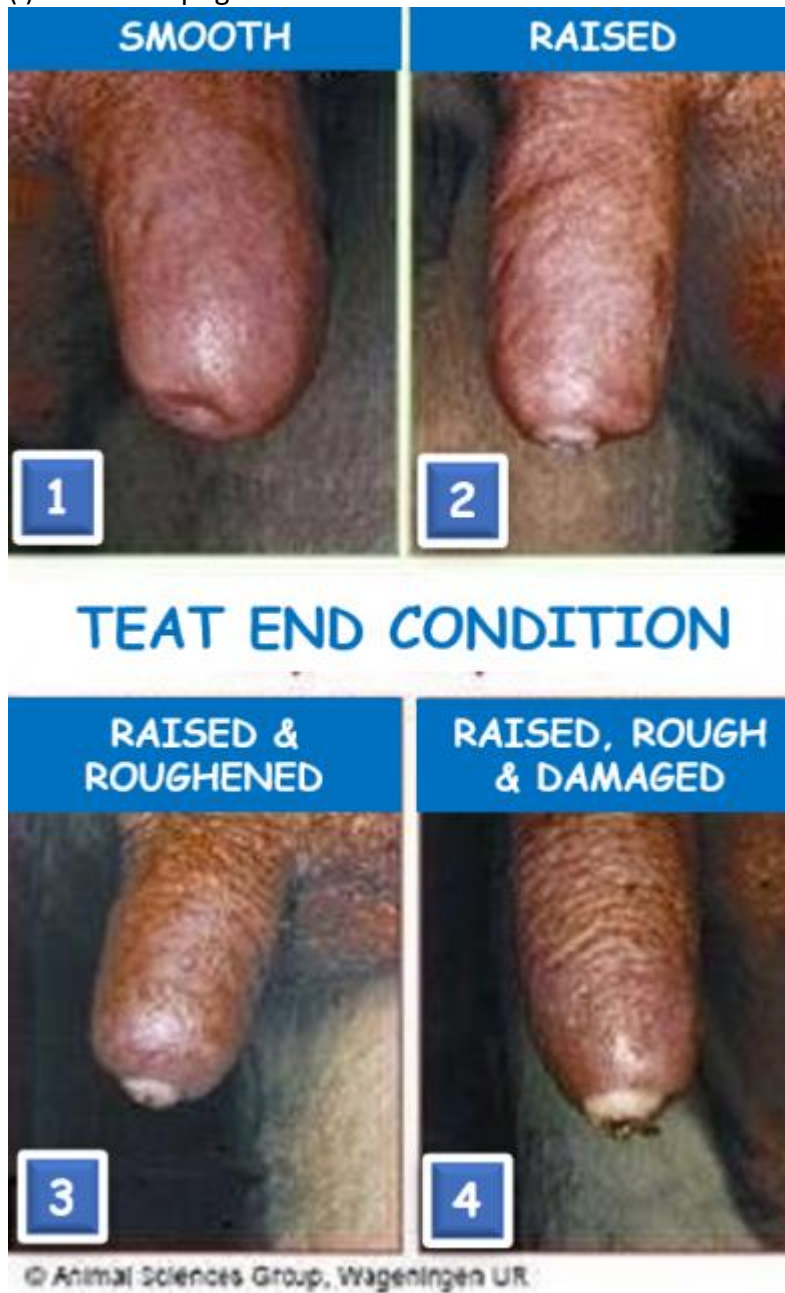
\_\_\_\_\_ Group 2

\_\_\_\_\_ Group 3

\_\_\_\_\_ Group 4

34) There is an association between teat end condition and udder health/milk quality.

( ) teatends1.png



Using these images as a guide, what percentage of milk cows can be classified under each group?

(Column to add up to 100%)

\_\_\_\_\_ Group 1

\_\_\_\_\_ Group 2

\_\_\_\_\_ Group 3

\_\_\_\_\_ Group 4

**35) If you have cows in groups 3 and 4, what do you think is the cause:**

- ☐ My milk vacuum is higher:: \_\_\_\_\_
- ☐ Over milking
- ☐ Both
- ☐ No Opinion

**36) Are udders clipped or flamed and if so, how many times per year?**

- ☐ Clipped (times/year): \_\_\_\_\_
- ☐ Flamed (times/year): \_\_\_\_\_
- ☐ No

**37) Do tail switches get trimmed?**

- ☐ Yes - How many times per year:: \_\_\_\_\_
- ☐ No

**38) Do you dock the tails of heifers and/or adult cows?**

- ☐ Yes
- ☐ No

**39) Do you specifically select for udder/teat conformation?**

- ☐ Yes
- ☐ No

**40) What is your annualized cull rate for cows, including animals sold and died (for all reasons)?**

\_\_\_\_\_

**41) How many cows were culled and/or died each month from April 2015 - March 2016?  
(Original survey period)**

	Cows sold to slaughter	Cows died
March 2016	_____ _____	_____ _____
February 2016	_____ _____	_____ _____
January 2016	_____ _____	_____ _____
December 2015	_____ _____	_____ _____

November 2015	_____ _____	_____ _____
October 2015	_____ _____	_____ _____
September 2015	_____ _____	_____ _____
August 2015	_____ _____	_____ _____
July 2015	_____ _____	_____ _____
June 2015	_____ _____	_____ _____
May 2015	_____ _____	_____ _____
April 2015	_____ _____	_____ _____

**42) Please feel free to provide any additional general information:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

---

### Employees

**43) How many full time employees work on the dairy?**

\_\_\_\_\_

**44) How many part time employees work on the dairy?**

\_\_\_\_\_

**45) Of the employees involved with milking, how many:**

Milk full time: \_\_\_\_\_

Milk part time: \_\_\_\_\_

Assist but don't milk (e.g. moving cows, cleaning):

\_\_\_\_\_



**46) The full time workers that are milking cows in the parlour work on average how many hours per day?**

**Logic: Show/hide trigger exists.**

**47) Do your milking employees receive milker training?**

☐ Yes

☐ No

**Logic: Hidden unless: Question "Do your milking employees receive milker training?" #47 is one of the following answers ("Yes")**

**How formal is this training?**

0 \_\_\_\_\_ [ ] \_\_\_\_\_ 100

**Logic: Hidden unless: Question "Do your milking employees receive milker training?" #47 is one of the following answers ("Yes")**

**Who is responsible for milker training?**

☐ Owner

☐ Manager

☐ MPO

☐ Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "Do your milking employees receive milker training?" #47 is one of the following answers ("Yes")**

**Is there any cost associated with milker training and what might this amount be?**

**48) What is the hourly rate paid to your employees working full time (Rand/hour)?**

Milking Labour:: \_\_\_\_\_

Other Labour:: \_\_\_\_\_

**49) Do milkers get paid any incentives for low SCC/fewer mastitis cases?**

☐ Yes

☐ No

**50) Do milkers get penalized for high SCC/too many mastitis cases?**

☐ Yes

☐ No

**Logic: Show/hide trigger exists.**

**51) How often do you have employee meetings for milkers?**

- ☐ Every week
- ☐ Every month
- ☐ Every 3 months
- ☐ Twice a year
- ☐ Once a year
- ☐ Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "How often do you have employee meetings for milkers?" #51 is one of the following answers ("Every week", "Every month", "Every 3 months", "Twice a year", "Once a year", "Other:")**

**What is the average duration of the meetings with milkers?**

\_\_\_\_\_

**Logic: Show/hide trigger exists.**

**52) Do you have Standard Operating Procedures (SOPs)?**

- ☐ Yes
- ☐ No

**Logic: Hidden unless: Question "Do you have Standard Operating Procedures (SOPs)?" #52 is one of the following answers ("Yes")**

**How formal are the SOPs?**

0 \_\_\_\_\_ [ ] \_\_\_\_\_ 100

**Logic: Hidden unless: Question "Do you have Standard Operating Procedures (SOPs)?" #52 is one of the following answers ("Yes")**

**For which of the following do you have formal SOPs?**

(Please select all that apply)

- ☐ Milking procedure
- ☐ Mastitis detection
- ☐ Mastitis treatment
- ☐ Dry cow treatment
- ☐ Parlour cleaning (incl. outside of milking machines)
- ☐ Milking machine cleaning / CIP
- ☐ Sick cow diagnosis and treatment
- ☐ Feeding
- ☐ Vaccination
- ☐ Calving cows

**53) Please feel free to provide any additional information on employees:**

\_\_\_\_\_  
\_\_\_\_\_

## Veterinarian & Consultants

Logic: Show/hide trigger exists.

**54) Do you make use of a veterinarian on a regular basis?**

☐ Yes

☐ No

Logic: Hidden unless: Question "Do you make use of a veterinarian on a regular basis?"  
#54 is one of the following answers ("Yes")

**Do you consider your veterinarian a "specialist" in dairy cattle?**

☐ Yes

☐ No

Logic: Hidden unless: Question "Do you make use of a veterinarian on a regular basis?"  
#54 is one of the following answers ("Yes")

**How often does the veterinarian visit the farm?**

☐ Weekly

☐ Every 2 weeks

☐ Monthly

☐ Other:: \_\_\_\_\_

Logic: Hidden unless: Question "Do you make use of a veterinarian on a regular basis?"  
#54 is one of the following answers ("Yes")

**What is the consultation fee charged by your veterinarian and how many hours per month does he/she spend on the dairy?**

Rand/hour: \_\_\_\_\_

Hours/month: \_\_\_\_\_

Logic: Hidden unless: Question "Do you make use of a veterinarian on a regular basis?"  
#54 is one of the following answers ("Yes")

**What percentage of the veterinarian's time is spent working specifically with udder health and mastitis (as compared to for example reproduction and general sick cow work)?**

\_\_\_\_\_

Logic: Show/hide trigger exists.

**55) Do you use a nutritionist?**

☐ Yes

☐ No

**Logic: Hidden unless: Question "Do you use a nutritionist?" #55 is one of the following answers ("Yes")**

**How often does the nutritionist visit the dairy?**

☐ Every 2 weeks

☐ Monthly

☐ Every 6 weeks

☐ Other:: \_\_\_\_\_

**Logic: Show/hide trigger exists. Hidden unless: Question "Do you use a nutritionist?" #55 is one of the following answers ("Yes")**

**Who is the nutritionist affiliated with?**

☐ Feed company

☐ Independent

☐ Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "Who is the nutritionist affiliated with?" is one of the following answers ("Feed company")**

**How many hours per month does the nutritionist spend on the dairy?**

\_\_\_\_\_

**Logic: Hidden unless: Question "Who is the nutritionist affiliated with?" is one of the following answers ("Independent", "Other:")**

**What is the consultation fee charged by your nutritionist and how many hours per month does he/she spend on the dairy?**

Rand/hour: \_\_\_\_\_

Hours/month: \_\_\_\_\_

**56) Please feel free to provide any additional veterinarian/consultant information:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Nutrition

**Logic: Show/hide trigger exists.**

**57) What type of feeding system do you use?**

- ☐ TMR
- ☐ Pasture
- ☐ Pasture + TMR
- ☐ Pasture + Concentrate
- ☐ Other: \_\_\_\_\_

**Logic: Hidden unless: Question "What type of feeding system do you use?" #57 is one of the following answers ("Pasture", "Pasture + TMR", "Pasture + Concentrate")**

**In general, do you consider your pastures to be relatively clean and dry or could they do with some improvement?**

- ☐ Clean and dry
- ☐ Could be improved, with explanation:  
\_\_\_\_\_

**Logic: Hidden unless: Question "What type of feeding system do you use?" #57 is one of the following answers ("TMR", "Pasture + TMR", "Pasture + Concentrate")**

**How many times per day do you feed your lactating cows?**

- ☐ Once a day
- ☐ Twice a day
- ☐ Three times a day
- ☐ Multiple:: \_\_\_\_\_

**Logic: Show/hide trigger exists.**

**58) Is dairy concentrate fed in the parlour during milking time?**

- ☐ Yes
- ☐ No

**Logic: Hidden unless: Question "Is dairy concentrate fed in the parlour during milking time?" #58 is one of the following answers ("Yes")**

**What percentage of the daily concentrate amount is fed in the parlour during milking?**

\_\_\_\_\_

**59) If you are feeding your cows outside (TMR or concentrate), is fresh feed available to cows when leaving the parlour?**

- ☐ Yes
- ☐ No

**60) What is the feed intake and the most recent average cost of the ration fed to the following groups of cows?**

	Amount As Fed (kg)	Amount DM (kg)	DM %	DM Cost (Rand)
Hig h Pro duc ing Co ws	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
All Lac tati ng Co ws	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
Ste am Up Co ws	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
Dry Co ws	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____

**Logic: Show/hide trigger exists. Hidden unless: Question "Which of the following management groups do you have?" #28 is one of the following answers ("Dry and steam up cows in separate groups")**

**Do you feed additional or higher levels of Vit E during the steam up period?**

☐ Yes

☐ No

**Logic: Hidden unless: Question "Do you feed additional or higher levels of Vit E during the steam up period?" is one of the following answers ("Yes")**

**What level of Vit E do you feed and what is the cost?**

Product brand name:: \_\_\_\_\_

Amount (grams/cow/day):: \_\_\_\_\_

Cost (cents/cow/day):: \_\_\_\_\_

**Logic: Show/hide trigger exists. Hidden unless: Question "Which of the following management groups do you have?" #28 is one of the following answers ("Dry and steam up cows in separate groups")**

**Do you feed anionic salts during the steam up period?**

☐ Yes

☐ No

**Logic: Hidden unless: Question "Do you feed anionic salts during the steam up period?" is one of the following answers ("Yes")**

**Do you measure urine pH to monitor your anionic salt program?**

☐ Yes

☐ No

**Logic: Hidden unless: Question "Which of the following management groups do you have?" #28 is one of the following answers ("Dry and steam up cows kept in one group", "Dry and steam up cows in separate groups")**

**Are dry and steam up cow rations the same?**

☐ Yes

☐ No

**61) Please feel free to provide any additional information on nutrition:**

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## Housing

**62) Where are the following groups of cows kept:**

	Indoor	Indoor with outdoor access	Outdoor with no shade	Outdoor with shade	Pastures	Other
Milking Cows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dry Cows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steam up/Transition Cows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heifers 90 days before calving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**63) What type of flooring is used in the following areas:**

	Concrete	Dirt	Other
Walkways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parlour Holding Area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Indoor Housing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Logic: Hidden unless: ((Question "Walkways" is one of the following answers ("Other") AND Question "Parlour Holding Area" is one of the following answers ("Other")) AND Question "Indoor Housing" is one of the following answers ("Other"))**

**Please comment:**

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**Logic: Show/hide trigger exists.**

**64) Do you occasionally overcrowd your milk cows for management purposes?**

☐ Never

☐ For short periods of time only



☐ I maximize my housing facility

**Logic: Hidden unless: Question "Do you occasionally overcrowd your milk cows for management purposes?" #64 is one of the following answers ("For short periods of time only", "I maximize my housing facility")**

**Is this a regular management exercise?**

☐ Yes

☐ No

**Logic: Show/hide trigger exists.**

**65) Is fly control an important part of your management routine?**

☐ Yes

☐ No

**Logic: Hidden unless: Question "Is fly control an important part of your management routine?" #65 is one of the following answers ("Yes")**

**Do you consider fly control effective in your housing area/parlour?**

☐ Yes

☐ No

**66) Please feel free to provide any additional housing information:**

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### **Milking Parlour**

**Logic: Show/hide trigger exists.**

**67) What type of milking parlour do you have?**

☐ Side opening

☐ Herringbone

☐ Rapid exit/parallel

☐ Swing-over

☐ Rotary

☐ Other:: \_\_\_\_\_

**68) Who is the manufacturer of your milking parlour equipment?**

☐ Afikim

☐ DeLaval

☐ Other:: \_\_\_\_\_

**69) Who is the manufacturer of your pulsators?**

☐ Same as other parlour equipment

**70) How often are the pulsators tested?**

- ☐ Weekly
- ☐ Monthly
- ☐ Quarterly
- ☐ Yearly
- ☐ Other:: \_\_\_\_\_

**71) How often do you rebuild your pulsators?**

- ☐ Monthly
- ☐ Quarterly
- ☐ Yearly
- ☐ Other:: \_\_\_\_\_

**72) What is your vacuum level? (kPa)**

\_\_\_\_\_

**73) My parlour has the following:**

- ☐ Milk meters
- ☐ Automatic take-offs
- ☐ Backflush
- ☐ Conductivity
- ☐ Other:: \_\_\_\_\_

**Logic: Show/hide trigger exists. Hidden unless: Question "What type of milking parlour do you have?" #67**

**Who is responsible for general parlour maintenance (milking machines, milk meters, rubberware, gates, software and hardware)?**

- ☐ Person on farm
- ☐ Person off farm

**Logic: Hidden unless: Question "Who is responsible for general parlour maintenance (milking machines, milk meters, rubberware, gates, software and hardware)?" is one of the following answers ("Person off farm")**

**Is this an independent contractor or a commercial company?**

- ☐ Private
- ☐ Company

**Logic: Hidden unless: Question "Who is responsible for general parlour maintenance (milking machines, milk meters, rubberware, gates, software and hardware)?" is one of the following answers ("Person off farm")**

**On what basis are parlour maintenance services provided?**

- ☐ Contract
- ☐ As needed

**Logic: Hidden unless: Question "Who is responsible for general parlour maintenance (milking machines, milk meters, rubberware, gates, software and hardware)?" is one of the following answers ("Person on farm", "Person off farm")**

**How often is routine parlour maintenance done?**

- ☐ Weekly  
☐ Biweekly  
☐ Monthly  
☐ Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "What type of milking parlour do you have?" #67**

**How many milking machine points does your parlour have?**

\_\_\_\_\_

**Logic: Hidden unless: Question "What type of milking parlour do you have?" #67**

**How many pulsators do you have?**

For/during milking: \_\_\_\_\_  
As spares: \_\_\_\_\_

**Logic: Hidden unless: Question "What type of milking parlour do you have?" #67**

**How often and by whom are your milk liners replaced?**

Person or company:: \_\_\_\_\_  
Interval (number of milkings):: \_\_\_\_\_  
Brand name:: \_\_\_\_\_  
Price (Rand/liner): \_\_\_\_\_

**Logic: Hidden unless: Question "What type of milking parlour do you have?" #67**

**How much effort does it take replacing all your liners?**

Time:: \_\_\_\_\_  
Number of Employees:: \_\_\_\_\_

**Logic: Hidden unless: Question "What type of milking parlour do you have?" #67**

**Are the shells washed during liner replacement?**

- ☐ Yes  
☐ No

**Logic: Show/hide trigger exists. Hidden unless: Question "What type of milking parlour do you have?" #67**

**Are you aware of liner slips as a cause of mastitis?**

- ☐ Yes  
☐ No

**Logic: Hidden unless: Question "Are you aware of liner slips as a cause of mastitis?" is one of the following answers ("Yes")**

**Are your employees trained to identify and correct liner slips?**

- ☐ Yes
- ☐ No

**74) Do you have drop hoses in your parlour?**

- ☐ Yes
- ☐ No

**75) Are udders washed and do they get wet in the parlour?**

- ☐ Yes
- ☐ No

**76) How often is the parlour cleaned/washed (walls, floor and exterior of milking machines)?**

- ☐ After every milking
- ☐ Once a day
- ☐ Other:: \_\_\_\_\_

**77) What product is used to clean/wash and what is the price?**

Brand name:: \_\_\_\_\_  
Rand/liter:: \_\_\_\_\_

**Logic: Show/hide trigger exists.**

**78) Is the parlour disinfected after washing?**

- ☐ Yes, the disinfectant is in combination with the cleaning agent
- ☐ Yes, separate product
- ☐ No

**Logic: Hidden unless: Question "Is the parlour disinfected after washing?" #78 is one of the following answers ("Yes, separate product")**

**How often is the parlour disinfected?**

- ☐ After every milking
- ☐ Once a day
- ☐ Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "Is the parlour disinfected after washing?" #78 is one of the following answers ("Yes, separate product")**

**What product is used to disinfect and what is the price?**

Brand name:: \_\_\_\_\_  
Price (Rand/liter):: \_\_\_\_\_

**79) What are the products used for the cleaning of the milking machines (clean in place or CIP)?**

	Product brand name	Unit	Price
Acid	_____ _____	_____ _____	_____ _____
Detergent	_____ _____	_____ _____	_____ _____
Sanitizer	_____ _____	_____ _____	_____ _____
Other	_____ _____	_____ _____	_____ _____

**80) What is the ideal water temperature (degrees celsius) you target for each CIP cycle?**

Rinse: \_\_\_\_\_

Wash: \_\_\_\_\_

Sanitizer: \_\_\_\_\_

**81) How many CIP wash cycles do you have?**

( ) Rinse, wash and sanitizer (3)

( ) Rinse and wash /sanitizer (2)

**82) Please feel free to provide any additional parlour information:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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### Milking Routine

**83) On average, how many cows do you milk per hour ?**

\_\_\_\_\_

**84) How many total hours per day are spent on milking?**

\_\_\_\_\_

**85) What is the average waiting time of cows before they are milked?**

\_\_\_\_\_

**Logic: Show/hide trigger exists.**

**86) Which of the following form part of your milking routine?**

- ☐ Milker gloves (latex or nitrile)
- ☐ Milking aprons
- ☐ Pre-dip
- ☐ Udder Wash
- ☐ Teat Wash
- ☐ Wipe
- ☐ Strip
- ☐ Post-dip
- ☐ Backflush

**Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Milker gloves (latex or nitrile)")**

**How many pairs and/or boxes of gloves are used per milking?**

Pairs: \_\_\_\_\_

Boxes: \_\_\_\_\_

**Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Milker gloves (latex or nitrile)")**

**What is the price of gloves?**

\_\_\_\_\_

**Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Milking aprons")**

**How often are aprons washed and replaced?**

Washing frequency:: \_\_\_\_\_

Replacement interval:: \_\_\_\_\_

**Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Pre-dip")**

**I am using the following pre-dip:**

Brand name: \_\_\_\_\_

Price (Rand/liter): \_\_\_\_\_

Contact Time(seconds): \_\_\_\_\_

Months Used: \_\_\_\_\_

Amount/cow/milking (ml): \_\_\_\_\_

Time spent to dip, wait and wipe (sec/cow/milking):

\_\_\_\_\_

I mix my own pre-dip or use a non-commercial product (please explain):

\_\_\_\_\_

**Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Udder Wash","Teat Wash")**

**What do you use to wash the cows udder/teats with?**

- ☐ Water
- ☐ Water plus detergent and/or disinfectant

**Logic: Show/hide trigger exists. Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Wipe")**

**What do you use to wipe teats clean?**

- ☐ Paper
- ☐ Cloth
- ☐ Commercial Product
- ☐ Don't wipe and immediately attach the milking machine

**Logic: Hidden unless: Question "What do you use to wipe teats clean?" is one of the following answers ("Paper")**

**How many cows are wiped with a single piece of paper?**

- ☐ One cow only
- ☐ Two or more cows

**Logic: Hidden unless: Question "What do you use to wipe teats clean?" is one of the following answers ("Cloth")**

**How many cows are wiped with a single cloth?**

- ☐ One cow only
- ☐ Two or more cows

**Logic: Hidden unless: Question "What do you use to wipe teats clean?" is one of the following answers ("Cloth")**

**How often is the cloth washed?**

\_\_\_\_\_

**Logic: Show/hide trigger exists. Hidden unless: Question "What do you use to wipe teats clean?" is one of the following answers ("Cloth")**

**Which of the following form part of the washing procedure for towels?**

- ☐ Hot water
- ☐ Cold water
- ☐ Soap
- ☐ Disinfectant

**Logic: Hidden unless: Question "Which of the following form part of the washing procedure for towels?" is one of the following answers ("Hot water")**

**What is the temperature of the hot water used to wash the cloth?**

Logic: Hidden unless: Question "What do you use to wipe teats clean?" is one of the following answers ("Commercial Product")

How many cows are wiped with a single commercial cloth?

- ☐ One cow only
- ☐ Two or more cows

Logic: Hidden unless: Question "What do you use to wipe teats clean?" is one of the following answers ("Commercial Product")

What brand of commercial product is used and what is the price?

Brand: \_\_\_\_\_

Price (Rand/wipe): \_\_\_\_\_

Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Strip")

What is used for stripping and mastitis detection?

- ☐ Floor
- ☐ Cup
- ☐ Other (Apron)

Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Strip")

How much time is spent on stripping? (sec/cow/milking)

\_\_\_\_\_

Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Strip")

What is your target time from stripping to attachment of the milking machine?

\_\_\_\_\_

Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Post-dip")

I am using the following post-dip:

Brand name: \_\_\_\_\_

Price(Rand/liter): \_\_\_\_\_

Months Used: \_\_\_\_\_

Amount/cow/milking (ml): \_\_\_\_\_

Time spent (sec/cow/milking): \_\_\_\_\_

I mix my own post-dip or use a non-commercial product (please explain):

\_\_\_\_\_

Logic: Show/hide trigger exists. Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Backflush")

What do you use to backflush?



- ☐ Water
- ☐ Water + Disinfectant

**Logic: Hidden unless: Question "What do you use to backflush?" is one of the following answers ("Water", "Water + Disinfectant")**

**What is the temperature of the water used to backflush?**

\_\_\_\_\_

**Logic: Hidden unless: Question "Which of the following form part of your milking routine?" #86 is one of the following answers ("Backflush")**

**When is the cluster flushed?**

- ☐ After every cow is milked
- ☐ Only after cows with abnormal milk are milked
- ☐ Other:: \_\_\_\_\_

**87) How would you rate the cleanliness of the following:**

	Good	Average	Bad
Milker Gloves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Milker Apron	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Milk Clusters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**88) Please feel free to provide any additional milking routine information:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Udder Health**

**89) What was the last monthly average BMSCC?**

Average: \_\_\_\_\_

**90) What was your monthly BMSCC from April 2015 - March 2016? (Original survey period)**

	Monthly BMSCC
March 2016	_____
February 2016	_____
January 2016	_____
December 2015	_____
November 2015	_____
October 2015	_____
September 2015	_____
August 2015	_____
July 2015	_____
June 2015	_____
May 2015	_____
April 2015	_____

**Logic: Show/hide trigger exists.**

**91) Do you test individual cows and / or groups for subclinical mastitis to detect high somatic cell count (SCC) cows?**

- ☐ Yes
- ☐ No

**Logic: Hidden unless: Question "Do you test individual cows and / or groups for subclinical mastitis to detect high somatic cell count (SCC) cows? " #91 is one of the following answers ("Yes")**

**How often do you test?**

- ☐ Monthly
- ☐ Every two months
- ☐ Every quarter
- ☐ Biannually
- ☐ When needed

**Logic: Hidden unless: Question "Do you test individual cows and / or groups for subclinical mastitis to detect high somatic cell count (SCC) cows? " #91 is one of the following answers ("Yes")**

**Who is responsible for detecting cows with subclinical mastitis on the farm?**

- ☐ Owner
- ☐ Manager
- ☐ Employees
- ☐ Other

**Logic: Show/hide trigger exists. Hidden unless: Question "Do you test individual cows and / or groups for subclinical mastitis to detect high somatic cell count (SCC) cows? " #91 is one of the following answers ("Yes")**

**What method do you use to detect cows with a high SCC?**

- ☐ Routine herd milk sampling for SCC testing in the laboratory
- ☐ California Mastitis Test performed cow-side
- ☐ Conductivity
- ☐ Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "What method do you use to detect cows with a high SCC? " is one of the following answers ("Routine herd milk sampling for SCC testing in the laboratory", "California Mastitis Test performed cow-side")**

**What type of milk sample is taken?**

- ☐ Composite milk sample (one sample per cow)
- ☐ Quarter milk samples (four samples per cow)

**Logic: Show/hide trigger exists.**

**92) Do you do routine whole herd individual cow SCC testing?**

- ☐ Yes
- ☐ No

**Logic: Hidden unless: Question "Do you do routine whole herd individual cow SCC testing?" #92 is one of the following answers ("Yes")**

**How often do you do whole herd SCC testing?**

- ☐ Monthly
- ☐ Quarterly
- ☐ Biannually
- ☐ Annually
- ☐ Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "Do you do routine whole herd individual cow SCC testing?" #92 is one of the following answers ("Yes")**

**How much effort does it take to collect milk samples:**

Time:: \_\_\_\_\_

Number of Employees:: \_\_\_\_\_

**Logic: Hidden unless: Question "Do you do routine whole herd individual cow SCC testing?" #92 is one of the following answers ("Yes")**

**What are the costs for testing a milk sample for SCC (cost for SCC only, i.e. excluding cost for shipping, testing BF and / or protein)?**

\_\_\_\_\_

**93) Do you routinely keep cows with high SCC separated?**

- ☐ Yes
- ☐ No

**Logic: Hidden unless: Question "Do you do routine whole herd individual cow SCC testing?" #92 is one of the following answers ("Yes")**

**Do you routinely treat cows with a high SCC?**

- ☐ Yes
- ☐ No

**Logic: Show/hide trigger exists.**

**94) Our definition of mastitis is: A cow that has abnormal milk (discoloured with or without flakes) and / or the presence of visible inflammation of the udder as evidenced by an udder that is hot, tense, swollen and / or painful.**

**Do you agree?**

- ☐ Yes
- ☐ No

**Logic: Hidden unless: Question "Our definition of mastitis is: A cow that has abnormal milk (discoloured with or without flakes) and / or the presence of visible inflammation of the**

udder as evidenced by an udder that is hot, tense, swollen and / or painful.

Do you agree?

" #94 is one of the following answers ("No")

What is your definition of mastitis?

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Logic: Show/hide trigger exists.

95) Do you routinely make use of milk cultures for bacterial isolation to determine the mastitis causing organism?

☐ Yes

☐ No

Logic: Hidden unless: Question "Do you routinely make use of milk cultures for bacterial isolation to determine the mastitis causing organism?" #95 is one of the following answers ("Yes")

Which mastitis cows do you routinely sample and submit to the laboratory for culture of the causative organism?

☐ All cases

☐ Selected cases

Logic: Hidden unless: Question "Do you routinely make use of milk cultures for bacterial isolation to determine the mastitis causing organism?" #95 is one of the following answers ("Yes")

Which organisms are most commonly Isolated?

(Please list in order of occurrence starting with the most commonly isolated)

	Isolated organism	Number of cases in last month
1	<hr/> <hr/>	<hr/> <hr/>
2	<hr/> <hr/>	<hr/> <hr/>
3	<hr/> <hr/>	<hr/> <hr/>

**Logic: Show/hide trigger exists. Hidden unless: Question "Do you routinely make use of milk cultures for bacterial isolation to determine the mastitis causing organism?" #95 is one of the following answers ("Yes")**

**Do you do routinely request antimicrobial sensitivity testing to determine the best antibiotic to use?**

- ☐ Yes
- ☐ No

**Logic: Hidden unless: Question "Do you do routinely request antimicrobial sensitivity testing to determine the best antibiotic to use?" is one of the following answers ("Yes")**

**If you do, which class(es) of drug does the testing suggest that you should use?**

- ☐ Penicillin
- ☐ Oxytetracycline
- ☐ Ampicillin
- ☐ Ceftiofur
- ☐ Sulpha's
- ☐ Other:: \_\_\_\_\_

**Logic: Hidden unless: Question "Do you routinely make use of milk cultures for bacterial isolation to determine the mastitis causing organism?" #95 is one of the following answers ("Yes")**

**Are the recommended antibiotics working as expected?**

- ☐ Yes
- ☐ No (please comment):: \_\_\_\_\_

**96) How do you detect clinical mastitis in cows?**

(Please check all that apply)

- ☐ Swollen udder
- ☐ Abnormal milk
- ☐ Elevated temperature
- ☐ Conductivity
- ☐ Other:: \_\_\_\_\_

**Logic: Hidden unless: QUESTION NOT FOUND! is one of the following answers [NO OPTIONS SET]**

**Who is responsible for the detection of cows with clinical mastitis?**

- ☐ Owner
- ☐ Manager
- ☐ Employees
- ☐ Other

**97) How are cows with mastitis identified after detection?**

(Check all that apply)

- ☐ Records
- ☐ Markings/leg band on the cow
- ☐ Automated milking system prevents milking
- ☐ Other:

**98) How is the specific quarter(s) identified after detection?**

(Check all that apply)

- ☐ Records
- ☐ Markings on the leg and / or quarter
- ☐ Other:

**99) What method of record keeping do you use for mastitis cows?**

- ☐ Computer
- ☐ Paper
- ☐ Memory

**Logic: Show/hide trigger exists.**

**100) Are cows with clinical mastitis segregated from the rest of the herd?**

- ☐ Yes
- ☐ No

**Logic: Hidden unless: Question "Are cows with clinical mastitis segregated from the rest of the herd?" #100 is one of the following answers ("Yes")**

**How are clinical mastitis cows segregated?**

- ☐ Not segregated (with milk cows)
- ☐ With recently calved cows
- ☐ With sick cows
- ☐ With recently calved and sick cows
- ☐ Alone

**101) What are the number of cases per month from April 2015 - March 2016? (Original survey period)**

	Number of Mastitis cases
March 2016	_____
February 2016	_____
January 2016	_____
December 2015	_____
November 2015	_____
October 2015	_____
September 2015	_____
August 2015	_____
July 2015	_____
June 2015	_____
May 2015	_____
April 2015	_____

**102) What percentage of your total annualized culling rate can be attributed to mastitis?**

\_\_\_\_\_



**103) How many cows have been culled each month from April 2015 - March 2016?  
(Original survey period)?**

	Number of cows culled
March 2016	_____
February 2016	_____
January 2016	_____
December 2015	_____
November 2015	_____
October 2015	_____
September 2015	_____
August 2015	_____
July 2015	_____
June 2015	_____
May 2015	_____
April 2015	_____

**104) What are the approximate percentages of mastitis cases by lactation over the last 6 months?**

(Column to total 100%)

\_\_\_\_\_ First Lactation

\_\_\_\_\_ Second Lactation

\_\_\_\_\_ Third Lactation

**105) What are the approximate percentages of mastitis cases by stage of lactation over the last 6 months?**

(Column to total 100%)

\_\_\_\_\_ Less than 90 DIM

\_\_\_\_\_ 90 to 300 DIM

\_\_\_\_\_ Greater than 300 DIM

**106) What would you say is the average cost of a single mastitis case?  
(Including treatment, labour, loss in milk production etc.)**

\_\_\_\_\_

**107) Please share with us your opinion on clinical mastitis in your herd:**

	Agree	Disagree
Every case of mastitis means a lot of work	( )	( )
Mastitis is difficult to manage	( )	( )
I wish that I had fewer cases of mastitis	( )	( )
Every case of mastitis is a serious concern	( )	( )
I really could do more to prevent mastitis	( )	( )
I have enough knowledge	( )	( )

regarding mastitis		
I don't have many mastitis cases but the BMSCC is a concern	<input type="checkbox"/>	<input type="checkbox"/>
It's not good to work too clean	<input type="checkbox"/>	<input type="checkbox"/>
I could learn more about mastitis	<input type="checkbox"/>	<input type="checkbox"/>

**Logic: Show/hide trigger exists.**

**108) In general, are you satisfied with the treatment and control of mastitis in your herd?**

☐ Yes

☐ No

**Logic: Hidden unless: Question "In general, are you satisfied with the treatment and control of mastitis in your herd?" #108 is one of the following answers ("No")**

**Why aren't you satisfied with the current treatment and control of mastitis?**

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**Logic: Show/hide trigger exists.**

**109) Do you routinely treat clinical mastitis with antibiotics?**

☐ Yes

☐ No

☐ Selected cows (please comment)::

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Logic: Hidden unless: Question "Do you routinely treat clinical mastitis with antibiotics?" #109 is one of the following answers ("Yes")

What is your first choice of antibiotic treatment by any of the following routes:

	Brand name	Price (Rand/tube )	Amount (ml)	Number of times treated	Interval between treatments (hours)
Intrama mm ary	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____
Inje ctab le	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____
Oth er	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____

Logic: Hidden unless: Question "Do you routinely treat clinical mastitis with antibiotics?" #109 is one of the following answers ("Yes")

How long has this treatment regimen been in place?

\_\_\_\_\_

Logic: Show/hide trigger exists. Hidden unless: Question "Do you routinely treat clinical mastitis with antibiotics?" #109 is one of the following answers ("Yes")

Do you treat according to product label directions OR is treatment either extended and/or given at a higher dose?

- ☐ According to label
- ☐ Extended treatment
- ☐ Higher dosage
- ☐ Extended treatment + higher dosage

Logic: Hidden unless: Question "Do you treat according to product label directions OR is treatment either extended and/or given at a higher dose?" is one of the following answers ("Extended treatment", "Higher dosage", "Extended treatment + higher dosage")

Is this according to instructions from your veterinarian?

☐ Yes

☐ No

Logic: Hidden unless: Question "Do you routinely treat clinical mastitis with antibiotics?" #109 is one of the following answers ("Yes")

On average, for how many days in total does the milk of mastitis cows get discarded?

Logic: Show/hide trigger exists. Hidden unless: Question "Do you routinely treat clinical mastitis with antibiotics?" #109 is one of the following answers ("Yes")

Do you have a second treatment protocol?

☐ Yes

☐ No

Logic: Hidden unless: Question "Do you have a second treatment protocol?" is one of the following answers ("Yes")

Second choice of antibiotic treatment:

	Brand name	Price (Rand/tube )	Amount (ml)	Number of times treated	Interval between treatments (hours)
Intr amma mm ary	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____
Inje ctab le	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____
Oth er	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____

**Logic: Hidden unless: Question "Do you have a second treatment protocol?" is one of the following answers ("Yes")**

**How long has this treatment regimen been in place?**

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**Logic: Hidden unless: Question "Do you have a second treatment protocol?" is one of the following answers ("Yes")**

**Do you treat according to label? Or is treatment extended and/or given at a higher dose?**

- ☐ According to label
- ☐ Extended treatment
- ☐ Higher dosage
- ☐ Extended treatment + higher dosage

**Logic: Hidden unless: Question "Do you routinely treat clinical mastitis with antibiotics?" #109 is one of the following answers ("Yes")**

**On average, how many days do cows being treated for mastitis spend in the hospital?**

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**110) What additional drugs do you use for clinical mastitis cows (such as medication for pain and / or inflammation, vitamins, etc.)?**

	Brand Name	Price (Rand/unit)	Amount (specify unit)	Number of times given	Interval between treatments (specify unit)	Method of administration
1	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____

**111) Does mastitis milk get fed to heifer calves?**

☐ Yes

☐ No

**Logic: Show/hide trigger exists.**

**112) Have you had any what you would consider mastitis outbreaks within the last 12 months?**

☐ Yes

☐ No

**113) What were the number of outbreaks during this 12 month period?**

\_\_\_\_\_

**Logic: Hidden unless: Question "Have you had any what you would consider mastitis outbreaks within the last 12 months?" #112 is one of the following answers ("Yes")**

**In what month did the last two outbreaks occur and what were the number of cases per outbreak?**

Last outbreak (month):: \_\_\_\_\_

Number of cases:: \_\_\_\_\_

Prior outbreak (month):: \_\_\_\_\_

Number of cases:: \_\_\_\_\_

**114) Do you routinely treat cows with a high SCC and if so cows with a SCC over what value are treated?**

☐ Yes, if their SCC is over:: \_\_\_\_\_

☐ No

**115) Cows with a high SCC are treated using:**

☐ First choice intramammary antibiotic treatment (as described earlier)

☐ Second choice intramammary antibiotic treatment (as described earlier)

☐ Other antibiotic treatment, e.g. intramuscular (please describe)::

\_\_\_\_\_

**116) Please indicate who the primary person is that is responsible for each of the following:**

(Please select one for each of the 3 items)

	Owner	Manager	Employees	Veterinarian
Parlour management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mastitis cow diagnosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mastitis cow treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**117) Please indicate if there are any additional people (not identified above) that are responsible for the following:**

(Please check all that apply)

	Owner	Manager	Employees	Veterinarian
Parlour management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mastitis cow diagnosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mastitis cow treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Logic: Show/hide trigger exists.**

**118) Do you vaccinate to prevent mastitis?**

☐ Yes

☐ No

**Logic: Hidden unless: Question "Do you vaccinate to prevent mastitis?" #118 is one of the following answers ("Yes")**

**Which cows are vaccinated?**

☐ Heifers prior to 1st calving

☐ Milking cows

☐ Both

**Logic: Hidden unless: Question "Do you vaccinate to prevent mastitis?" #118 is one of the following answers ("Yes")**

**Please provide the following information regarding the vaccine that you use:**

Number of doses/cow/year:: \_\_\_\_\_

How long have you been using this product (years):: \_\_\_\_\_

Brand name:: \_\_\_\_\_

Cost (Rand/dose):: \_\_\_\_\_

**119) Please feel free to provide any additional udder health information:**

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## Survey Exit Questions

**120) The survey does a good job of asking questions about all aspects of mastitis treatment and prevention:**

0 \_\_\_\_\_ [ ] \_\_\_\_\_ 100

**Comments:**

**121) The survey was logical and easy to understand:**

0 \_\_\_\_\_ [ ] \_\_\_\_\_ 100

**Comments:**

**122) The survey was too long and/or too complicated:**

0 \_\_\_\_\_ [ ] \_\_\_\_\_ 100

**Comments:**

**123) To what extent are your responses based on current, accurate data and not guestimates:**

0 \_\_\_\_\_ [ ] \_\_\_\_\_ 100

**Comments:**