

Impact matrix analysis and cost-benefit calculations to improve management practices regarding health status in organic dairy farming

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D5.3 – Cost-Benefit relations of health related measures

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Executive Summary

This document provides information on the costs-benefit relations of health related measures and describes the cost-benefit module that estimates and calculates failure and preventive costs of four common production disorders: mastitis, lameness, ketosis and metritis. The module can be used by farmers and/or veterinary advisors to explore the effect of a selected intervention programme to improve the animal health status or farm income given their specific farm situation.

Dissemination Level						
PU	Public	PU				
PP	Restricted to other program participants (including the Commission Services)					
CO	Confidential, only for members of the Consortium (including Commission Services)					



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1 Introduction

Production diseases have a serious impact on the productivity of a dairy farm by reducing the efficiency with which resources (e.g. feedstuffs and health care) are converted into products (McInerney, 1996). The need to improve overall animal health status is important to organic dairy farmers as better animal health is an important motivation for consumers to buy organic products (Hughner et al., 2007). In general, the total cost of an animal disease is the sum of the production losses and the control expenditures. Cost factors for dairy production diseases are those for cow replacements, veterinary services, diagnostics, drugs, discarded milk, labour efforts, decreased performance, decreased milk quality, and increased risk of new cases of the same disease or of other diseases (Halasa et al., 2007). Mastitis, fertility problems, lameness, and metabolic disorders represent the main production diseases within dairy farming (Rushton, 2009). Recent publications provide estimations of the costs of mastitis, ranging from 61 \in to 97 \in per average cow per year. The most important cost factors were related to milk production losses and culling (Hogeveen et al., 2011). For reproductive disorders a non-linear effect was found by Inchaisri et al. (2010) when comparing farms with good, average and bad reproductive performance. Recent cost calculations on lameness and metabolic disorders (ketosis) estimated average losses of 53 € (Bruijnis et al., 2010) and 20 € (Ostergaard et al., 2000) per cow per year. These cost estimations have been made for conventional dairy farms. No scientifically described estimations for organic dairy farms are known. Because of the higher costs of input (cow replacement, feed, etc.), economic consequences of disease on organic farms are expected to be higher than on conventional farms.

The disease costs described above can be regarded as "failure costs" (Hogeveen et al., 2011), associated with animals attaining a disease (e.g. due to production losses and veterinary treatment). They do not include costs for preventive measures, associated with the management measures adopted by dairy farmers to prevent the animals of becoming affected by the disease. In theory the "failure costs" and "preventive costs" share a substitution relationship, following a downward convex curve, in-line with the economic principle of diminishing returns (McInerney et al., 1992). The higher the expenditures for preventive measures (preventive costs), the lower are the losses of disease (failure costs). Insights into the expected losses and expenditures would make it possible to optimise the disease management of individual farmers. However, no proper models are currently available to support such an on-farm decision making process. Farm specific cost calculations would give a better insight into the magnitude of a health problem and will, consequently, improve the adoption rate of advised measures. Some on-farm animal health decision supporting tools are currently available (e.g. Huijps, 2009). In most of these models, however, the support is based on an extraction and application of general rules to individual farms, not accounting for farm specific characteristics as well as restrictions or limitations regarding available resources. Moreover, the majority of these supporting tools only consider the expected impact related to the presence of a single disease and only estimate the failure costs of a disease thereby ignoring the preventive costs associated with a disease. For an optimisation of effective animal health management a multiple disease approach is a necessity (Stott et al., 2012) that focuses on both the failure and preventive costs associated with these diseases.

Given the current lack of information on the economic impact of production diseases in organic dairy farming, we developed a model in-line with the partial budgeting theory which is able to evaluate the farm-specific costs and benefits of recommended measures, given the current health status of individual organic farms. This report explains the developed model to estimate the failure and prevention costs of the four most common production disorders (mastitis, lameness, ketosis and metritis) on organic dairy farms.



2 Basic structure of the model

The developed cost-benefit module has been constructed according to the partial budget method (Dijkhuizen and Morris, 1997) and has been updated to encompass the failure-prevention framework suggested by Hogeveen et al. (2011). Basically, the model estimates the total costs of the four common production disorders (Berge and Vertenten, 2014): mastitis, lameness, ketosis and metritis. In the cost-benefit module total costs are defined as the sum of failure costs and preventive costs. Failure costs are defined as the costs associated with animals becoming (sub) clinically ill (e.g. production losses and veterinary treatment). Preventive costs are the costs associated with the management measures adopted by dairy farmers to prevent the animals from becoming affected by the disease. The advantage of the partial budget method is that only those factors that actually change are estimated and the user only requires limited information. It is furthermore possible to focus on one disease only or to estimate the costs of several diseases. A note should be made that the model estimates the costs of each disease individually and potential interactions between these diseases are not estimated. Results on the costs of a disease should therefore be interpreted individually and as a whole. Meaning, it is important to interpret the costs of each of the measures together with the expected improvement in animal health status as this gives a better view on whether the new intervention strategy is beneficial to implement

2.1 Model input

The basic model input for the cost-benefit tool includes:

- Herd characteristics
 - Milk production, number of dairy cows
- Herd health characteristics
 - o Mastitis, lameness, ketosis and metritis
- Price input
 - Milk price, feed price, wage, replacement value, slaughter price, penalties, bonuses
- Farm characteristics
 - o Replacement rate, culling, death

Herd health characteristics, different input is required for each specific disease. Mastitis requires input on the incidence of clinical mastitis and somatic cell count (SCC) classes, in which the first is derived from health recordings (or alternatively farmers' estimates) and the latter is derived from milk recordings. Lameness requires input on lameness scoring, ideally hoof trimming records are used. Alternatively users could estimate the incidence of moderately lame and severely lame animals in which it should be kept in mind that farmers tend to underestimate the severity of lameness (Bruijnis et al., 2010). Ketosis requires input on the fat-protein ration, if fat-protein ration has been larger than 1.5 within the first 100 days in milk the cow is diagnosed to be at risk with ketosis. Metritis has been divided into clinical metritis and subclinical metritis, diagnosis of these illnesses has to be performed by the farmer according to predefined definitions. Clinical metritis is defined as: an animal that is not systematically ill, but has an abnormally enlarged uterus and a purulent discharge detectable in the vagina, within 21 days post-partum. Clinical endometritis is defined as: the presence of purulent (>50% pus) uterine discharge detectable in the vagina 21 days or more after parturition, or mucuopurulent (approximately 50% pus, 50% mucus) discharge detectable in the vagina after 26 days post-partum.



Specific price input is requested from the user. However, if a user is not sure about his input, default values can be used. The most influential price input are requested: milk price, feed price, labour costs, replacement value of a dairy cow, costs of destruction, slaughter price, penalties paid and bonuses received as a consequence of an elevated/ low SCC.

A very visible part of the failure costs of mastitis consist of treatment costs. Treatment of clinical disease differs on organic farms in comparison with conventional dairy farms. Organic farmers are more prudent in the use antibiotics and more often apply alternative treatment schedules, including treatment options that require additional labour input, such as frequent milking of infected udder quarters. Costs of treatments have are being evaluated in the IMPRO WP4 (task 4.4). Preliminary results from WP4 have been used to design the treatment costs input screen. Factors, including default values that are important to determine the failure costs due to treatments were based upon WP4.

When all input data has been collected, the users have to decide which management measures they would like to implement on the farm. If the desired measure(s) is/are not included it/they can be manually added to the set of measures (up to 3 measures). Given the selected measures veterinary advisors/ farmers have to decide what the impact of the measures will be on animal health characteristics of the herd. E.g. if measure x is implemented on the farm by how much will it reduce disease y. The cost-benefit tool does not give any reference values of the expected effect of the chosen management measures. If the farmer is the user, he/she is advised to consult the veterinary advisors on this topic. Preferentially the model is completed by a farmer and veterinary advisor together. However skilled and trained farmers should be able to complete the model as well.

2.2 Costs estimation

Failure costs can be determined based on the general structure given in Figure 1. The general structure holds for each of the four diseases. However, given the specific nature of the diseases some effect may be more substantial for one disease than another (e.g. percentage production loss). Failure costs generally consist of costs of (sub)clinical production losses, discarded milk, medication, labour, homeopathic treatment, culling and destruction. Country specific exemptions e.g. withdrawal period can be changed if these are not in-line with default values.

For each disorder at least 9 measures were derived from literature/ expert knowledge and costs were estimated. An overview of the measures associated with mastitis, ketosis, lameness and metritis are presented in Tables 1-4. These measures are all "extra" measures which could be performed to improve the animal health status, next to the already implemented measures. Note that we do not estimate the costs of the current management strategy we only focus on what has changed after the new implemented management strategy.

Each of these management measures consist of three distinct costs:

- Labour, costs of labour associated with performing the measure.
- Consumables, costs of material necessary to complete the measure
- Investments, costs of investments that are generally present on the farm for longer than one year

These basic three components were used to estimate the preventive costs for each of the management measures.



The amount of labour needed to complete the measure once was assessed and how often the measure was applied on the farm (e.g. five minutes of labour per clinically lame cow per day). The associated costs of labour were either assessed by the farmer or default values were used (e.g. \in 20 / hour). Materials necessary to perform the measure once were inventoried and the costs of materials to fully complete the measure were assessed (e.g. one pair of milkers' gloves per milking). Long term investments required to complete the measure were determined per measure (e.g. new fence to keep cows standing) together with the associated costs and depreciation period (e.g. 15 years). A simple linear depreciation method was used to assess the yearly costs of investments.

Given the expected effect the model estimates current failure costs, potential failure costs and potential preventive costs. The difference between the current failure costs and potential total costs is the effect of the management measures on farm income. Current preventive costs do not need to be determined as it is assumed the current set of measures remains the same in the potential situation. When current costs are higher compared to potential costs the intervention programme improves farm income and vice versa.

2.3 Derived management measures

An initial link from work package four to five was made in the description of work in which management measures were derived from the tasks described in work package four. Collection of management measures based on restricted empirical data is hard and on itself provides no information whether it is beneficial to reduce the specific disease on the farm. It was therefore decided to perform a literature search on which measures were truly beneficial. For each specific disease recent scientific work on management measures was reviewed and management measures were eligible to be included when they had a significant effect on the reduction of the specific disease. Furthermore veterinary literature was used to check whether common recommended measures were missing.





Figure 1 General structure of the failure costs Input is requested at the parallelogram, technical assumptions are made in the squares and economic assumptions and calculations are made at the squares within a square, partial costs are derived at the pill shaped boxes, each path should be followed to estimate the total failure costs of a disease.



Table 1 Management measures mastitis

Mill	king procedures	Abbreviation
1	Milkers' gloves are worn during every milking	Gloves
2	All cows are prestripped	Pre-stripping
3	For all cows, a separate cloth is used to clean the udder before at-	Clean udder
	taching the cluster	
4	All cows are treated with a good teat disinfectant after milking (PMTD)	PMTD
5	All cows with an elevated SCC (>250,000 cells/mL) are milked last	SCM milked last
6	All cows with clinical signs are milked last	CM milked last
7	Teat cup liners are replaced according to the manufacturer's norm	Replace teat cup
8	After milking a cow with clinical signs, the cluster is rinsed with hot	CM rinse cluster
	water before another cow is milked	
9	After milking a cow with subclinical mastitis, the cluster is rinsed with	SCM rinse cluster
	hot water before another cow is milked	
10	Dirty udders are washed with water and dried before attaching the	Wash dirty udder
	cluster	
11	After milking, cows are kept standing for at least 30 minutes	Keep cows standing
Ηοι	ısing	
12	Decrease the number of cows to prevent overcrowding	Prevent overcrowding
13	Clean all cubicles twice every day and make sure enough and clean	Clean cubicles
	bedding material is present	
14	Manually clean the yards twice a day	Clean yards
Dry	period	
15	All cows are dried off with an appropriate antibiotic	Dry off
Oth	er	
16	A treatment protocol is set up together with a veterinarian and every	Treatment protocol
	month the therapies are evaluated together	
17	Add appropriate minerals to the feed of dry cows	Minerals
18	Optimize the feed according to farm-specific needs	Optimize feed

Table 2 Management measures lameness

Far	m system	Abbreviation					
1	Decrease the number of cows to prevent overcrowding	Prevent overcrowding					
Но	using						
2	Groove concrete floors (vs. smooth concrete floor)	Groove floor					
3	Manually clean the yards twice a day	Clean yards					
4	Improve foot bath management	Foot bath					
5	Improve foot trim management	Trim hoof					
6	Improve feeding ration	Feed ration					
7	Increase frequency of checking the cows	Check cows					
Cu	bicle dimension and design						
8	Clean cubicles appropriately / Clean all cubicles twice every day and	Clean cubicles					
	make sure enough and clean bedding material is present						
9	Manually scrape floors (vs. automatic scraper) /Manually clean the	Scrape floors					
	yards twice a day						
10	Use of curbs in cubicles to keep bedding inside	Use curbs					

Table 3 Management measures ketosis

Но	ousing	Abbreviation					
1	Decrease the number of cows to prevent overcrowding	Prevent overcrowding					
2	Clean heifer feeding platform daily	Clean feeding platform					
3	Keep cows in (\geq 2) separate groups during dry period (use of far-off	Dry-period groups					
	and close-up group)						
Fe	eding						
4	Improve nutritional management	Improve nutrition					
Feed additives							
5	Monensin bolus during dry-period	Monensin bolus					
С	ow specific measurements						
6	Control blood NEFA values for all dairy cows (threshold ≥ 0.30	NEFA all cows					
	mEq/L)						
7	Control blood NEFA values for all dairy cows with disturbed FPR (fat	NEFA disturbed FPR					
	protein ration) within the first 100 days of lactation						
8	Use of keto-strip to measure ketone bodies	Measure ketone bodies					
9	Pre-calving body condition score (BCS) check and registration	BCS registration					



Table 4 Management measures metritis

Far	m system	Abbreviation				
1	Provide clean and new straw bedding in the calving pen before	Calving pen bedding				
	every calving					
2	Keep cows in (≥ 2) separate groups during dry period (use of	Dry period groups				
	far-off and close-up group)					
3	Minimize the number of new introduction in new dry cow pen	Minimize new animals				
Но	using					
4	Prevent reduced feeding time and DMI both post-calving and	Feed intake				
	pre-calving (during transition period)					
5	Supply appropriate minerals and trace elements in the right	Minerals				
	balance					
Cul	picle dimension and design					
6	Pre-calving body condition score (BCS) check and registration	BCS registration				
7	Control fresh cows multiple times per day for at least ten days	Control fresh cows				
8	Always use gloves and use lube to ensure proper hygiene while	Hygiene during check				
	checking the cow puerperal					
9	Maintain high hygiene state during calving, wash hands and	Hygiene during calving				
	maintain all materials clean and rinse with warm water and de-					
	contamination soap					
10	After milking, cows are kept standing for at least 30 minutes	Keep cows standing				



3 Case study

3.1 Mastitis

For the purpose of illustrating the model we assume a farm with 100 dairy cows, a rolling milk production of 8,310 kg milk/ year, a total of 30 cows that attained clinical mastitis and a bulk tank somatic cell count of 300,000 cells/ml. All other input variables are kept at default values. These results in current failure costs of €17,441 / year. An intervention strategy is set-up that consists of prestripping all cows, wash dirty udders and clean cubicles. This would result in potential failure costs of €5,252. The farmer and veterinary advisor believe this intervention strategy will reduce the number of clinical cases of mastitis by 15 and prevent cows from reach SCC above 300,000 cells/ml. The new SCC distribution will change to: SCC<50 10%, SCC 50-100 30%, SCC 100-200 40% and SCC 200-300 20%. Potential failure costs will therefore reduce to € 11,492 / year. The implementation of the set of measures and the assumed reduction in udder health status will therefore improve farm income by €219 / year given the expected efficacy of the set of measures. For this farm the individual costs of each measure are presented in Table 5. For this specific farm the least expensive measure would be the use of milkers' gloves (€219/ year) and the most expensive measures would be to use a separate cloth for every cow before attaching the cluster (€4218 / year). It is important to interpret the costs of each of the measures together with the expected improvement in animal health status as this gives a better view on whether the new intervention strategy is beneficial to implement. The preventive costs of a certain management programme have no meaning without the associated reduction in failure costs. The methodology of this case is the same for lameness, ketosis and metritis.



Mil	king procedures	Expected costs
		(€ /year)
1	Gloves	€ 219
2	Pre-stripping	€ 2,028
3	Clean udder	€ 4,218
4	PMTD	€ 2,129
5	SCM milked last	€ 1,550
6	CM milked last	€ 1,267
7	Replace teat cup	€ 477
8	CM rinse cluster	€ 246
9	SCM rinse cluster	€ 1,099
10	Wash dirty udder	€ 422
11	Keep cows standing	€ 675
Ho	using	
12	Prevent overcrowding ¹	€ 2,270
13	Clean cubicles	€ 3,280
14	Clean yards	€ 2,068
Dry	/ period	
15	Dry off	€ 1,140
Oth	ner	
16	Treatment protocol	€ 640
17	Minerals	€ 957
18	Optimize feed	€ 1,067
	timated for a farm with 99 available lying spaces	

Table 5 Costs of management measures to improve udder health status on a farm with 100 dairy cows, in which30 cows attained CM and BMSCC is 300.000 cells/ml, all other input variables remained default

estimated for a farm with 99 available lying spaces.



3.2 Lameness

The input for this case is similar to the input used in 3.1 and 15 and 25 cows were assumed to have attained severe and moderate lameness last year. For this situation the individual costs of each measure are presented in 6. For this specific farm the least expensive measure would be to improve the frequency of checking the cows (\in 200/ year) and the most expensive measures would be to improve hoof trimming management (\notin 2,600 / year).

Table 6 Costs of management measures to improve lameness status on a farm with 100 dairy cows, incidence of moderate lameness and severe lameness was set at 0.25 and 0.15

Far	m system	Expected costs
		(E /year)
1	Prevent overcrowding ¹	€ 2,270
Ho	using	
2	Groove floor	€ 420
3	Clean yards	€ 2,068
4	Foot bath	€ 1,637
5	Trim hoof	€ 2,600
6	Feed ration	€ 200
7	Check cows	€ 147
Cu	bicle dimension and design	
8	Clean cubicles	€ 3,280
9	Scrape floors	€ 2,068
10	Use curbs	€ 200

¹ estimated for a farm with 99 available lying spaces.



3.3 Ketosis

The input for this case is similar to the input used in 3.1 and in which 25 dairy cows attained subclinical ketosis and 2 attained clinical ketosis. Subclinical ketosis is identified using test day records in which cows are assumed subclinical when the fat-protein ratio >1.5 during the first 100 days in lactation (Krogh et al., 2011). Clinical ketosis is based on treatment records of either the veterinarian of farmer for the respective farm. For this situation the individual costs of each measure are presented in Table 7. For this specific farm the least expensive measure would be to register body condition scores pre-calving (\leq 163/ year) and the most expensive measures would be to keep cows in a far-off and close-up group (\leq 2435 / year).

Table 7 Costs of management measures to improve ketosis status on a farm with 100 dairy cows, incidence of clinical and subclinical ketosis was set at 0.02 and 0.25

Н	ousing	Expected costs (€ /year)
1	Prevent overcrowding ¹	€ 2,270
2	Clean feeding platform	€ 791
3	Dry-period groups	€ 2,435
Fe	eeding	
4	Improve nutrition	€ 880
Fe	eed additives	
5	Monensin bolus	€ 208
С	ow specific measurements	
6	NEFA all cows	€ 1,471
7	NEFA disturbed FPR	€ 375
8	Measure ketone bodies	€ 204
9	BCS registration	€ 163

¹ estimated for a farm with 99 available lying spaces.



3.4 Metritis

The input for this case is similar to the input used in 3.1 and 25 cases of clinical metritis and 15 cases of clinical endometritis were assumed. For this situation the individual costs of each measure are presented in Table 8. For this specific farm the least expensive measure would be to minimize the number of new introductions in the dry-cow pen (\in 80/ year) and the most expensive measures would be to control the fresh cows multiple times per day for at least ten days (\in 5,092 / year).

Table 8 Costs of management measures to improve (endo)metritis status on a farm with 100 dairy cows, in which25 cows attained clinical metritis and 15 cows attained subclinical metritis

Far	m system	Expected costs (€ /vear)
1	Calving pen bedding	€ 2.680
2	Dry period groups	€ 2,435
3	Minimize new introductions	€ 80
Но	using	
4	Feed intake	€ 2,274
5	Minerals	€ 1,042
Cu	bicle dimension and design	
6	BCS registration	€ 163
7	Control fresh cows	€ 5,092
8	Hygiene during check	€ 675
9	Hygiene during calving	€ 306
10	Keep cows standing	€ 686



4 Strengths of the model

The constructed model is able to estimate both the failure costs and preventive costs of four common production disorders on organic dairy farms in the EU. Previous models have estimated the failure costs of each of the four production diseases. However, no previous work has estimated the preventive costs of these diseases and thereby lacked which part of the costs of the disease can truly be reduced. The model can easily be used by both farmers and veterinary advisors. It is however advised to complete the model together to best use the full capacities of the model.

The main strengths of the model concern the applicability of the model. The model can easily be used in approximately ten minutes to quickly assess the costs of one disease on farm level. On the other hand one could easily spend one hour (or more) in making the model as farm specific as possible by going through the list of assumptions and change this in-line with the individual farm. The model is therefore useful and flexible model both as a generic model (simple and fast calculations) and as a specific model (in-depth and reliable calculations) whichever suits the users' needs.

We can conclude that the model that has been constructed to estimate the costs and benefits of animal health is a very useful tool since it is versatile in its usability. The model can be used as a generic and relative quick calculation method for estimating the costs of a single disease or made farm specific in which complete farm records (technical and economic) can be used as input for the model. The model thereby, fulfils the needs of most users. At the same time, the model can extend the scientific knowledge on the total economic impact of the four most common production disorders in organic dairy farming.



5 References

- Berge, A.C., and G. Vertenten. 2014. A field study to determine the prevalence, dairy herd management systems, and fresh cow clinical conditions associated with ketosis in western European dairy herds. *J. Dairy Sci.* 97:2145–54. doi:10.3168/jds.2013-7163.
- Bruijnis, M.R.N., H. Hogeveen, and E.N. Stassen. 2010. Assessing economic consequences of foot disorders in dairy cattle using a dynamic stochastic simulation model. *J. Dairy Sci.* 93:2419– 2432. doi:http://dx.doi.org/10.3168/jds.2009-2721.
- Dijkhuizen, A.A., and R.S. Morris. 1997. Animal health economics: principles and applications.
- Halasa, T., K. Huijps, O. Østerås, and H. Hogeveen. 2007. Economic effects of bovine mastitis and mastitis management: a review. *Vet. Q.* 29:18–31. doi:10.1080/01652176.2007.9695224.
- Hogeveen, H., K. Huijps, and T.J.G.M. Lam. 2011. Economic aspects of mastitis: new developments. *N. Z. Vet. J.* 59:16–23. doi:933054794 [pii] 10.1080/00480169.2011.547165 [doi].
- Hughner, R.S., P. McDonagh, A. Prothero, C.J. Shultz, and J. Stanton. 2007. Who are organic food consumers? A compilation and review of why people purchase organic food. *J. Consum. Behav.* 6:94–110. doi:10.1002/cb.210.
- Huijps, K. 2009. Economic decisions in mastitis management. PhD thesis, Utrecht pp.
- Inchaisri, C., R. Jorritsma, P.L.A.M. Vos, G.C. van der Weijden, and H. Hogeveen. 2010. Economic consequences of reproductive performance in dairy cattle. *Theriogenology*. 74:835–846. doi:http://dx.doi.org/10.1016/j.theriogenology.2010.04.008.
- Krogh, M.A., N. Toft, and C. Enevoldsen. 2011. Latent class evaluation of a milk test, a urine test, and the fat-to-protein percentage ratio in milk to diagnose ketosis in dairy cows. *J. Dairy Sci.* 94:2360–7. doi:10.3168/jds.2010-3816.
- McInerney, J.P., K.S. Howe, and J.A. Schepers. 1992. A framework for the economic analysis of disease in farm livestock. *Prev. Vet. Med.* 13:137–154. doi:http://dx.doi.org/10.1016/0167-5877(92)90098-Z.
- McInerney, J. 1996. Old economics for new problems livestock disease. *J. Agric. Econ.* 47:295–314. doi:10.1111/j.1477-9552.1996.tb00695.x.
- Ostergaard, S., J.T. Sørensen, and A.R. Kristensen. 2000. A stochastic model simulating the feeding-health-production complex in a dairy herd. *J. Dairy Sci.* 83:721–33. doi:10.3168/jds.S0022-0302(00)74934-4.
- Rushton, J. 2009. The economics of animal health and production. CABI, Wallingford.
- Stott, A., B. Vosough Ahmadi, C. Dwyer, B. Kupiec, C. Morgan-Davies, C. Milne, S. Ringrose, P. Goddard, K. Phillips, and A. Waterhouse. 2012. Interactions between profit and welfare on extensive sheep farms. *Anim. Welf.* 21:57–64. doi:10.7120/096272812X13345905673683.



6 Appendix I – Cost benefit Module

This manual describes the cost-benefit module stepwise.

6.1 Tab "Start"



- 1. Press the red arrow to continue to the next page, blue arrow can be pressed to advance to specific sections.
- 2. All tabs are presented below the model in which: TEXT always refers to text sections with information on what is to come. FC refers to initial input necessary to estimate failure costs and PC refers to preventive costs sections.

6.2 Tab "Text 1"

A	1 .	. (*	fx																					¥
A	В	с	D	E F	G	н	I J	к	L	M N	0	Р	Q	R S	т	U	v	W	x	Y	Z	AA	AB	AC
2	In the f	irst part o	of the ques	tionnaire v	ve try to ass	ess the cur	rent failure		e to four d															
3										e exact														
4											~													
6											3													
7 8						e herd char	acteristics a	und health		ristics and														
9	base pr	ice levels	are asked			of disease																		
10																								
12																								
13				Continue																				
15				-	e																			
17																								
18																								
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22																								
23																								
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31																								
33																								
34																								
36																								
37																								
39																								
41	START TEN	11 /801	FC 2 TEXT	0 / 00 1 / 00	1 Custom / BC	2 / BC 2 Out	om /0C 2 /0	C 2 Outtom	/DC 4 / DC	4 Curtam /10	M TEXT 2	OC S /TEVI	4 /1000 /	ASSUMPTIONS	MM Martin	ir corte	MM Lamono	er corte	MM V	toric corte	/ MM Mot	where control	/ FS 4	
Ready 📩		11/101/	TO A C TEAT S	LANGI AND	I COSCOTT / PC	2 / FC 2 0090	UNIX PC3X P	c o custom 2	CPUT / PU		IN CITEXT 3 (PCS / TEAT	4 2 1000 2	N220MP 110115	2 mill Masu	19 - COSES /	mm cattlette	100 - 00505	MM INE			100% 100%	Θ	• •

3. Users of the cost-benefit module are explained what they can expect in the next section



6.3 Tab "FC 1"

1	A	В		C	D	E	F		G	н	1	3	K	L	M	N	0	Р	Q	R	S	Т	U	V	W	х	Y
4	Input data from first																										- ñ
1	input data nominist																										
2	Please complete all fields, if som																										
	specified if desired but is not ob																										
3								_																			
4	Farm Identification number																										
5																											
0			-	400	Init		_																				
/	Number of dairy cows on the fan	m		100			- F																				
8	Total amount of milk produced la	ast year	-	331000 K	g milk /	year																					
9	Average milk production per cow	V ()		03 10 K	g milk / i	dairy co	w/year	- 4	+																		
10		and a second second	-	20			. L										-										
11	Number of clinical cases of mast	itis last year		30 #	cows / y	/ear												8. C. C.									
12																											
13																											12
14	Number of dairy cows above soc	100.000 cells /ce		20			_																				
10		200.000 cells/m	-	50 0	cows/ y	ear	_																				
17		200.000 cells/m	-	20 1	cows / y	icar	5																				
10	1	500.000 censy m		30 1	COW5/ 4	ear	•																				
19	Number of rases of severe lame	nocc last year	1	15	cours / w	ia ar		_																			
20	Number of cases of moderate lar	meness last year		25	cows / y	/ear																					
21			- L_																								
22	Number of dairy cows with subcl	linical ketosis.																									
23	cows with fat / protein ration > 1	.5 in the first 10	0																								
24	days of lactation			25 #	cows / v	/ear																					
25																											
26																											
27																											
28	Only specify this part when you h	ave specific info	ormati	on on th	e numbe	r of cow	vs treated w	ith(out	t) antibiotics	or homeop	athic therapy																
29	for mastitis or lameness. If no ma	ore is available p	lease	leave bla	nk																						
30						-																					
31	The number of dairy cows with c	linical mastitis o	on this	farm un			30 # cow	s / yea	ar																		
32	Out of these dairy cows we assur	me the followin	g di		atr	nent (no	ote that mo	e trea	itments than	cases is pos	sible}, please																
33	specify (input) if more informati	on is available		6																							
34				0		input			when input is	not specifie	ed we assume																
35	1.) Treated cases of clinical mast	itis with antibio	tics		_	_				24 # treatm	ients / year																
36	2.) Treated cases of clinical masti	itis without anti	biotic	s		-	_			0 # treatm	ients / year																
37	3.) Treated cases of clinical mast	itis with homeo	ppathi	ctreatm	ent	-				8 # treatm	ients / year																
38	untreated cases of clinical ma	istitis				L				0 # treatm	ients / year																
39																											-
14 4	+ > > START TEXT 1 FC 1	FC 2 / TEXT 2 /	PC 1	PC 1 C	ustom 📈	PC 2	PC 2 Custon	n /PC	C 3 / PC 3 Cu	stom / PC 4	4 / PC 4 Cust	m LOM	TEXT 3 / PC	5 / TEXT 4 / TO	OD ASSU	MPTIONS	/ MM Mast	itis - costs	/ MM Lan	neness - cos	sts / MM	Ketosis - costs	MM M	letritis - cost	s FS	(<u>u</u>	
Rea	ady 📶																							₩Q U 1	100% 😑	Ū.	+

- 4. Blue sections contain, calculation information and do not need to be changed
- 5. White coloured cells need specific input, on this page information from the annual milk recording system is entered.
- 6. This section does not need to be completed, however if specific information regarding treatment is present it can be entered here, it is encouraged to do so.

-	A1 + (* 🏂 Input data from questionnaire														~
1	А	В	C	D	E	F	G	Н	1	J	K	L	M N	0	
1															П
2	Please complete the following questions leave blank if you do not know the correct value for your farm, Please note that percent	tages need to	be filled in a	s											
3	a number without the %. If the answer to Q1 would be 30% you just enter 30.														
4															
5	Question		Input	Unit											
0	How many of your dairy cows have been treated by a veterinarian for ketosis on your farm last year?			2 # cows / year	7										
9	How many of your dairy cows have been showing signs of leary mentritis? Diagnosis before 21d arter calving			5 # cows / year	1										
9	ver unit er ten ent enterenenen. Bebeen uter une neerenenenenenenenenenenenenenenenene		-												
10	What was the average received milk price/ costs last year?			€/kg milk											
11	What was the average feed price/costs (including concentrates and roughage) last year?			€/kg milk		_									
12	How do you value your labour?			€/hour											
13	What was the average replacement value of a dairy cow last year?			€ / dairy cow	8										
14	What were the average costs of destruction of a dairy cow (incl. euthanasia, on-farm pick-up and destruction)?		-	€ / dairy cow	U U										
15	What was the average received slaughter price for a dairy cow last year?		-	€ / dairy cow		_									
16	What percentage of your total number of dairy cows has been replaced last year by a heifer?			%											
1/	What was the amount of expansion to be paid but year or a concerning of an elevated SCC28			E / year											
19	What was the amount of honic received last year as a consequence of a low SCC?*			£ / year											
20	* leave blank when no penalties or bonuses are paid or received		-	lof fear											=
21															
22	How many dairy cows have been culled from your farm for one of the following diseases last year, please specify per disease?	Mastitis		2 # cows / year											
23		Lameness		1 # cows / year											
24		Ketosis	_	0 # cows / year											
25		(Endo)Metrit	IS	0 # cows / year	9										
20	How many dainy cours have died on your farm for due to one of the following diseases last year, please specify per disease?	Mactific	1												
28	now many using cows nave used on your name to use to one of the following useases hast year, please specing per useases.	Lameness		2 # cows / year											
29		Ketosis		0 # cows / year											
30		(Endo)Metrit	is	0 # cows / year											
31			· · · · · · · · · · · · · · · · · · ·												
32															
33															
34															
35	Continue														
27															
38															
39															
40															
14 .	+ H START / TEXT 1 / FC 1 FC 2 / TEXT 2 / PC 1 / PC 1 Custom / PC 2 / PC 2 Custom / PC 3 / PC 3 Custom / PC 4 / PC 4	Custom / LO	M / TEXT 3 /	PC 5 / TEXT 4 /	COD / ASSUM	APTIONS	MM Mastitis - co	osts / MM I	ameness -	costs / M	4 Ketosis - co	ists / MM N	letritis - costs	FSI	 1

6.4 Tab "FC 2"

- 7. Information regarding clinical ketosis and (endo)metritis should be based on farmers estimated and entered here.
- 8. Costs/ prices of milk, feed, labour etc. should be entered here, price assumptions can be left blank and default values will then be used.
- 9. Information regarding culling and death should be entered here



6.5 Tab "PC 1"

Tab Pc 1 to Pc 4 are similar in construction, however the tabs refer to four different diseases: mastitis, lameness, ketosis and (endo)metritis. Therefore only tab "PC 1" will be described.

A1	- (*	J	Mastitis m	anagement																							×
AB	с	D	E	G	н	1	J K	L	M	N	0	Р	Q	R	S	Т	U	V	W	X	Y	Z	AA	AB	AC	AD	E
• Mactitic r	nana	ome																									ĥ
1 mastrus i	nana																										
2 Select the meas	ures that																										
3 Wilking proced	ures																										
4 Parcornewi	inasuus i	nanagen	ient	milking																							
5 D AI			a during very	minking																							
7 E0		\sim	cloth is used	to clean the	udder before	attaching the	duster																				
8 🗌 AI		υ	th a good tea	t disinfectant	after milking	(PMTD)																					
9 🗆 All		-	ed SCC (>250	000 cells/mL	are milked la	st																					
10 🗌 All c	ows with	clinical:	signs are milke	d last																							
11 Teat	t cup line	rs are rep	placed accordin	ng to the man	ufacterer's no	rm																					
12 🗌 Afte	er milking	a cow w	ith clinical sigr	is, the cluster	is rinsed with	hotwater bef	ore another c	ow is milke	d																		
13 🗌 Afte	er milking	a cow w	ith subclinical	mastitis, the	duster is rins	ed with hot wa	ter before and	other cow is	s milked																		
14 Dirt	y udders	are wash	ed with water	and dried bei	ore attaching	the cluster																					
15 Afte	er milking	, cows ar	e kept standin	g for at least :	0 minutes																						
16 Housing																											
17 Part of new 1	mastitis r	nanagem	nent																								
18 Dec	rease the	number	of cows to pre	vent overcro	vding																						-
19 Clea	in all cub	cles twic	e every day ar	id make sure	enough and c	lean bedding n	naterial is pre	sent																			
20 Man	ually de	an the ya	rds twice a day	(
21 Dry period																											
22 Part of new 1	masuus	nanagen kind off	with on opprov	oriate optibio	1.																						
24 Othorr	owsare	med on	with an approp	priate antibio	lic.																						
25 Part of news	mastitis r	nanagem	ent																								
26 Atr	eatment	Incotorol	is set up toget	her with a vet	erinarian and	every month	the therapies	are evaluat	ted together																		
27 Add	appropri	ate mine	rals to the fee	d of dry cows																							
28 🗌 Opti	imize the	feed acc	ording to farm	-specific nee	ds																						
29																											
30 I am missing a r	nanagem	ent mea	sures which I v	vant to apply	on my farm																						
31																											
32											11																
33																											
34											22.00																
35 Did you define	any miss	ng mana	gement measu	ures? If yes, th	ien please pr	ess the blue ar	row below. If	no, then pl	lease continu	ue by pres	ssing the re	d arrow															
36				_																							
37		6. C																									
20 Continue			12																								
40			- 12																								
			-																								Ψ.
Ready START	TEXT 1	AC1/1	-C 2 / TEXT 2	PC1 / PC1	custom / PC	Z / PC 2 Custo	m / PC3 / I	PC 3 Custom	1 Z PC 4 Z PI	C 4 Custon	n <u>/ LOM</u> /	TEXT 3 /	C 5 / TEXT	4 / TCOD	ASSUM	PTIONS /	MM Masti	B - COSTS	MM Lan	veness - cos	ts / MM I	cetosis - co	sts / MM I	etritis - cost	100% -		A 1

- 10. Indicate which measures will be part of the intervention strategy to reduce the disease by ticking the appropriate box.
- 11. Define custom measures in the blank space and tick the box to select the custom measure.
- 12. Press the blue arrow when you have defined your own custom measures, press the red arrow when you have not defined custom measures.

-	Copocar	• •		i oni	57.1		granera		nomoci	34.1				Sugres						-	Sens.	_	contrary				
*	A1		+ (n	fx.																							*
A	A	В	C	DE	F	G	н	I .	K	L	M	N O	Р	Q	R	S	т	U	v	W	х	Y	Z	AA	AB	AC	TE
1	_	1																									ĥ
2		You ha		d alternative	e udder he																						
-																											
3																											
4			nate the co				mplete five																				
5		_								-																	
6	1																										
7									-	_																	
8	1.1	How mu	ch labour do	you expect to u	ise to fully co	mplete this	measure on	ice		minutes t	o fully comple	te measure o	nce														
9																											
10																											-
11	1.2	How one	en a year wo	uid you apply th	his measurer i	e.g. once a	week would	1 DE 52		-																	
12		umes a j	/ear, e.g. two	ce a day would i	be 730 times :	a year)				times a ye	ar																
14	1.2	If there	are any short	term investme	inte la a-mad	ication dis	infortants)																				
15		accortat	ad with the r	neasure think al	hout what the	se could h	and how m	uch					10														
16		would th	ev cost for a	whole year?	boutwhatth			i derr	· · · · ·	short tern	investments	(6)	13														
17		WOULD U	icy cost for a	intoic years					-	SHORECEN																	
18	1.4	If there	are any long-	term investmer	nts (e.g. new)	milking parl	lor, new calv	ing pen)																			
19		associate	ed with the n	neasures think a	about what th	ese could b	e and how r	nuch																			
20		they wo	uld totally co	st and what the	depreciation	period wo	uld be (e.g. l	buildings																			
21		usually 1	15-20 yrs, mai	chinery usually :	10-15 years)					total inve	stment (€)																
22																											
23										10 depreciat	ion period (yr	5.)															
24																											
25	1.5	Are ther	e any costs n	ot accounted fo	ir in the previ	ous questio	ns (other th	an																			
26		labour, s	hort investm	ents (consumal	bles) and long	g term inve	stments), if :	so please																			
27		indicate	the expected	d costs						other cost	s																
28		_																									
29	2	2																									
30										1																	
31	2.1	How mu	ch labour do	you expect to u	ise to fully co	mplete this	measure or	ice		minutes t	o fully comple	te measure o	nce														
32																											
33								11-170																			
34	2.2	How oft	en a year wo	uid you apply th	his measure r	e.g. once a	week would	1 DE 52		-																	
35		timesa	rear, e.g. two	ce a day would i	be 730 times :	a year)				times a ye	sar																
27		If there	are any chort	term investme	inte (ofactantel																				
38	2.3	accortat	ed with the r	neasure think al	hout		and how m	uch																			
30		would th	iov cost for a	whole year?		4	und now n	active sector		short tern	investments	(6)															
40		area to the		and years						phote term	- mesaments	1.00															
14 4	E H ST	ART TE	XT 1 /FC 1	EC 2 TEXT 2	PC 1 PC 1	Custom /	PC 2 / PC 2	Custom / PC 3	PC 3 Custo	m /PC4 /	PC 4 Custom	I OM TEXT	3 / PC 5 / TE	XT 4 TCOD	ASSUMPT	TIONS MM	1 Mastitis - d	costs	MM Lamen	eten - costs	MM Ke	tosis - costs	MMM	etritis - costs	ES		n in
-0	1.51	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		Tente,		ousedin /	Cont rea	20000			e i carronin (BUT TEAT	01.100 (TE	1000	10001411	Terre X Pile				0000	A 1919 W	10000 10000	1 1999 19	Conto - Conto	1010		1.1

6.6 Tab "PC 1 Custom"

13. In this section, custom management measures related to mastitis can be defined, this part is similar for lameness, ketosis and (endo)metritis which can be found in tabs : "PC2 custom", "PC 3 custom" and "PC 4 Custom".



14. Estimation is divided in costs of labour, consumables, investment and other. Each specific section for a management measure needs to be defined, if parts are left blank no costs are assumed.

6.7 Tab "PC 5"

Clipboard G Font G Alignment	G. Number	G Styles		Cells Editing
A1 • (* fx Effect of intervention strategy				
A B C D E F	G H	I J K L M	N O P	Q R S T U V W
Effect of intervention strategy Head Size Head Size Sody milk production (ig milk per cow) Replacement percentage Z	100 8310 30%	Please indicate given the selected intervention program how many cases the intervention programme could pre next year	nme vent	
Dury cows with clinical mattits Dury cows with evere laneness Dury cows with mild laneness Dury cows with metrics	100 cours / year 15 # cows / year 25 # cows / year 25 # cows / year 25 # cows / year 25 # cows / year 15 # cows / year	2 #cows/year 2 #cows/year 3 #cows/year 2 #cows/year 2 #cows/year 2 #cows/year]	
16 17 18 19 10 10 11 12 13 14 15 16 16 17 18 19 10 10 11 12 12 13 14 14 15 15 16 17 17 17 18 19 10 10 10 11 11 12 12 13 14 14 15 15 16 16 17 17 18 19 19 10 10 10 10 10 11 12 12 13 14 15 16 16 17 18 <td>80 #cows/year 50 #cows/year 30 #cows/year</td> <td>Please indicate given the selected intervention program how the new distribution of cell count would be</td> <td></td> <td></td>	80 #cows/year 50 #cows/year 30 #cows/year	Please indicate given the selected intervention program how the new distribution of cell count would be		
20 Mastilis 27 All cows are prestripped 28 All cows with an elevated SCC (>350,000 cells/mi) are milked last 29 30 31 32 32 33 34 35 36 37 37 38 36 37 37 36 39 40	17	lamenes Decrease the number of cows to prevent overcrowding Improve feeding ration		Retoris Make sure all cows have acces to feed at the san Control blood NEPA values for all dairy cows will
Rest START / TEXT 1 / FC 1 / FC 2 / TEXT 2 / PC 1 / PC 1 Custom / PC 2 /	PC 2 Custom / PC 3 / PC 3 Custom / F	PC 4 / PC 4 Custom / LOM / TEXT 3 PC 5 / TEXT 4 / TCOD / ASS	SUMPTIONS / MM Mastitis - costs / MM Lameness - c	asts / MM Ketosis - costs / MM Metritis - costs / FS 4

- 15. Specify the number of cases that can be reduced once the selected measures have been implemented on the farm.
- 16. Specify the number of cows that are above a certain SCC threshold once the selected measures have been implemented on the farm. Note that the number of cows above SCC 100.000 cells/ml is includes the number of cows above SCC 200.000 and SCC 300.000 cells/ml and the number of cows above SCC 200.000 cells/ml includes the number of cows above SCC 300.000 cells/ml.
- 17. The selected management measures are presented here.



6.8 Tab "TCOD"

Clipboard is Font is	* Alignmi	ent	S Numbe	r 04		Style	\$		Cells		Editing	
A1 • Jx Udder health												
A	B C	D	Character and the	E	F	G H	H Materia	1		J	K L	Received.
2	Current situation	Future situation	Claw Health		Current situation	Future s	ituation		Curren	t situation	Future situat	tion
3 Failure costs	current situation	ruture situation	Failure costs		current situation	i i uture s	Failure cost	3	curren	conduction	Tuture situat	Failure costs
4 Milk production losses	€ 11,323	€ 9,790	Milk production	losses	€ 5,510	E	4,803 Milk produ	ction losses	€	4,674	€ 3,	740 Milk production losses
5 Costs of discarded milk (due to antibiotic treatment)	€ 2,197	€ 2,197	Costs of discarde	ed milk (due to antibiotic treatment)	€ 3,418	e	3,311 Costs of dis	carded milk (due to antibiotic t	treatment) €	-	e	 Costs of discarded milk (dual)
7 Costs of culling and destruction	€ 1,199 € 2,320	€ 1,100 € 2,320	Costs of culling	and destruction	€ <u>500</u>	6	2.919 Costs of the	lling and destruction	treated) €	1/2	6	Costs of culling and destru
8								8		24.22	- C	
9 Failure costs - udder health	€ 17,038	€ 15,473	Failure costs - cl	aw health	€ 12,438	E	11,750 Failure cost	ts - ketosis	£	4,846	€ 3,5	911 Failure costs - metritis
10							0					Description of the
12 Jahor 18		< 3.311	Preventive costs			e	- Labor	costs			6	- Labor
13 Consumables		€ .	Consumables			e	- Consumabl	es			é :	375 Consumables
14 Investments		€ -	Investments			€	2,470 Investment	ts			€ 2,:	270 Investments
15 16 Proventive cents, under health		e 2.211	Drouontius cost	- slaw health		6	2 470 Proventive	costs kotosis			6 2	645 Droughting south matritic
10 Preventive costs - udder nearth		¢ 3,311	Preventive costs	- claw health		e	2,470 Preventive	costs - Retosis			e 2,	645 Prevenuve costs - metritis
18 Current - total costs of udder health	€ 17,038	€ 18,785	Current - total or	osts of claw health	€ 12,438	e	14,220 Current - to	tal costs of ketosis	¢	4,846	€ 6,	557 Current - total costs of met
19												
Total costs of Udday boal	th managama		т	otal costs of Claw Healt	h managem	ent		Total co	sts of Ketosis			
22 Total costs of Udder heat	ith manageme	πτ		Star costs of claw fleat	ппападен	ient		Total Co	sts of Retosis			
23 € 20,000			€ 16,000				€ 7,000					€ 7,000
24 € 18,000			€ 14,000				€ 6,000		_			¢ 6,000
25 ¢ 16,000			€ 12,000									
20 € 14,000							€ 5,000					€ 5,000
28 € 12,000			€ 10,000				€ 4,000	+				£ 4,000
29 € 10,000	= Pre	ventive costs	£ 8,000			Preventive c	osts			= P	reventive costs	
30 € 8,000	= Fai	lure costs	¢ 6,000		· ·	Failure costs	€ 3,000			= F	ailure costs	€ 3,000
32 € 6,000			6 4 000				€ 2,000	+				€ 2,000
33 € 4,000			4,000									
34 € 2,000			¢ 2,000				€ 1,000					€ 1,000
35 C-			e- +		_		ε-					¢.
30 Current situation Future	e situation			Current situation Future	situation			Current situation	Future situation			Current s
38												
39 You expect that the new intervention strategy will ch	hange herd health char	acteristics to	You expect that	the new intervention strategy will cha	ange herd health d	haracteristic	s to You expect	that the new intervention stra	tegy will change her	d health cha	racteristics to	You expect that the new in
40	Current situation	Future situation	n Dalas saustikk		Current situation	Future s	ituation	with Manager	Curren	t situation	Future situat	tion
I ← → I START / TEXT 1 / FC 1 / FC 2 / TEXT 2 / PC 1	PC 1 CustomPC 2	PC 2 Custom	/PC 3 / PC 3 Cus	tom _PC 4 _ PC 4 Custom _LOM _1	TEXT 3 / PC 5 / TE	XT 4 TCOD	ASSUMPTIONS	MM Mastitis - costs / MM Lame	eness - costs 📈 MM K	etosis - costs	MM Metriti	is - costs / FS 4 II >
Ready 8												IIII 100% — U
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- 18. Failure and preventive costs are presented here for each specific disease.
- 19. The efficiency of the selected management measures is presented here
- 20. The selected measures are presented here



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21. The economic analysis is presented, separate for each disease

Note that the results can be printed on a4 format for the farmer/ advisor to keep.

6.9 Tab "Assumptions"

+	F114	• (* Fr																*
1	A B	c	D	E	F	G	н	1	J	ĸ	1	M	N	0	P	Q	R	S 🔺
1.1	Overvie	w of assumptions																
-	Con Albert Aubres	w or assumptions	al discussion to	22	adal faat islaal te	the farmer or destined from the first												
2	form winit: wa	riabler ID'r 1 - 17, 61-67 and 75-89) one can do so by entering (the value in the in	ZZ	ive row of the vari	able												
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4	ID Variable	Specification	Input Re	ference Sel	cted output 1	Init												
5	1 MP305		8310	6500	8310 k	g milk / dairy cow / year												
6	2 NDC		100	65	100													
7	3 NCLINS	Mastitis	30%	30%	30.00%													
8	4	Lameness : Score 3	15%		15.00%													_
9	5	Lameness : Score 2	25%		25.00%													_
10	6	Lameness: Score 1	60%		60.00%													_
11	7	Ketosis	2%	2%	2.00%													_
12	8	Metritis	25%	51%	25.00%													_
13	9 NSCLM	percentage of dairy cows with SCC < 50	10%	50%	10.00%													_
14	10	percentage of dairy cows with SCC 50-100	10%	20%	10.00%													_
15	11	percentage of dairy cows with SCC 100-200	30%	10%	30.00%													_
16	12	percentage of dairy cows with SCC 200-300	20%	10%	20.00%													_
17	13	percentage of dairy cows with SCC 300-400	21%	5%	21.00%													_
18	14	percentage of dairy cows with SCC >400	9%	5%	9.00%													_
19	15	Subclinical ketosis	25%	18%	25.00%													_
20	16	Endometritis	15%	20%	15.00%													_
21	17 MPLOSSIE	Mastitis		5%	5.00%													_
22	18	Lameness (score 3: severe)		8%	8.00%													_
23	19	Lameness (score 2: moderate)		3%	3.00%													_
24	20	Lameness (score 1: no lameness		0%	0.00%													_
25	21	Metritis (parity 1)		0.28%	0.28%													_
26	22	Metritis (parity 2)		0.26%	0.26%													_
27	23	Metritis (parity 3)		0.84%	0.84%													_
28	24	Metritis (parity ≥4)		0.54%	0.54%													_
29	25	Endometritis		0.00%	0.00%													_
30	26 MPLSCLH	dairy cows with SCC < 50		0.00%	0.00%													_
31	27	dairy cows with SCC 50-100		0.50%	0.50%													_
32	28	dairy cows with SCC 100-200		1.75%	1.75%													_
33	29	dairy cows with SCC 200-300		2.65%	2.65%													_
34	30	dairy cows with SCC 300-400		3.25%	3.25%													_
35	31	dairy cows with Scc. 4400		8.00%	8.00%													_
30	32	Subclinical Recosts		5.00%	5.00%													_
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22. Default assumptions can be changed in the respective column 'reference'. Default values with defined input do not need to be changed as these are already defined in the previous tabs. It is advised not to change these tabs as these assumptions are based on literature and expert knowledge. When changes to a tab starting with FS or losses needs to be made it should be addressed in the tab assumptions.

6.10 Tab "MM-mastitis costs"

All MM tabs refer to the costs of the management measures, changes regarding default values of the management measures can be made here. Some measures may also be relevant for other diseases than mastitis changes regarding a recurring measure should be made throughout the respec-



tive MM tabs. They can also be used to investigate how each measure is calculated and estimated. It is advised not to make any changes as estimates are made based on literature and expert knowledge.

6.11 Tab "FS-mastitis, Losses mastitis"

All tabs starting with FS or Losses are used to either estimate the future failure costs after implementation of the management measures or to estimate the current failure costs of the diseases. No changes should be made to these documents. Changes should be made to the default values of the tab "Assumptions". These tabs can be used for your reference to investigate and explore how the costs of each disease is estimated. Please note that the estimated costs of the different diseases cannot be summed together, specific interactions between diseases has not been taken into account.

