SCC and milk yield in herds using different approaches to dry cow therapy

UNIVERSITY OF HELSINKI
FACULTY OF VETERINARY MEDICINE

María J. Vilar, Riitta E. Niemi, Mari Hovinen, Heli Simojoki, Päivi J. Rajala-Schultz
Department of Production Animal Medicine

INTRODUCTION

Antibiotic dry cow therapy (DCT), an important part of most mastitis control programs worldwide, aims to reduce prevalence of intramammary infections (IMI) by eliminating existing IMI at dry-off and preventing new IMI during the dry period. The DCT can be given to all cows (blanket DCT--BDCT) or to selected cows with IMI (selective DCT--SDCT). Preventive use of antimicrobials is being questioned for its association with the increase of antimicrobial resistances. For this reason, prudent use of antimicrobials should lead to more rational and targeted use. The European Commission 2015/299/04 recommended avoiding routine treatment of cows at dry-off. In Finland, along other Nordic countries, use of SDCT has been implemented for decades[1]. Recently, also in other countries, SDCT has been adopted as an alternative to BDCT[2]. The use of SDCT has therefore been evaluated in several studies at cow or quarter level[3,4,5,6], but studies on herd level are sparse.

Objective: Evaluate associations between use of DCT with the SCC and milk yield at herd level in Finnish dairy farms.

MATERIALS AND METHODS

Study population

- 227 conventional farms responding to a survey in 2017[7]
- Herd level DHI (Dairy Herd Improvement) data of 2016

Data analyses

- Outcome: herd average SCC (x1000 cell/ml)
  herd average milk yield (kg/year)
- Main variable of interest: DCT approach
- Multiple regression $Y = \beta_0 + DCT_1 X_1 + (\beta_2 X_2 + \beta_3 X_3 + \cdots + \beta_n X_n) + \varepsilon$
- Backward elimination model-building. DCT approach and confounders kept in the final model (even if not significant).

DISCUSSION & CONCLUSIONS

➢ Most farms produced high milk quality, herd average SCC did not differ between BDCT and SDCT farms (Table 1). Regression models suggested that use of BDCT did not significantly impact herd average SCC (Table 2) nor milk yield (Table 3).

➢ Good farming practices generally increase milk yield and support good udder heath. Based on the results of the study, the higher milk yield the lower SCC, and *vice versa*.

➢ Farms with AMS (automatic milking system) had higher herd average SCC than farms with parlours or pipeline milking systems. Associations between AMS and increased SCC have been observed earlier[8]. Also, these AMS farms had higher milk yield. Earlier studies also reported higher milk yield in farms with AMS than in farms with other milking systems[7,9].

➢ The results of this study confirm that, it is possible to produce high quality milk and maintain good udder health by using SDCT, while following the guidelines for a prudent use of antimicrobials.

RESULTS

Figure 1: Set of variables considered for the models

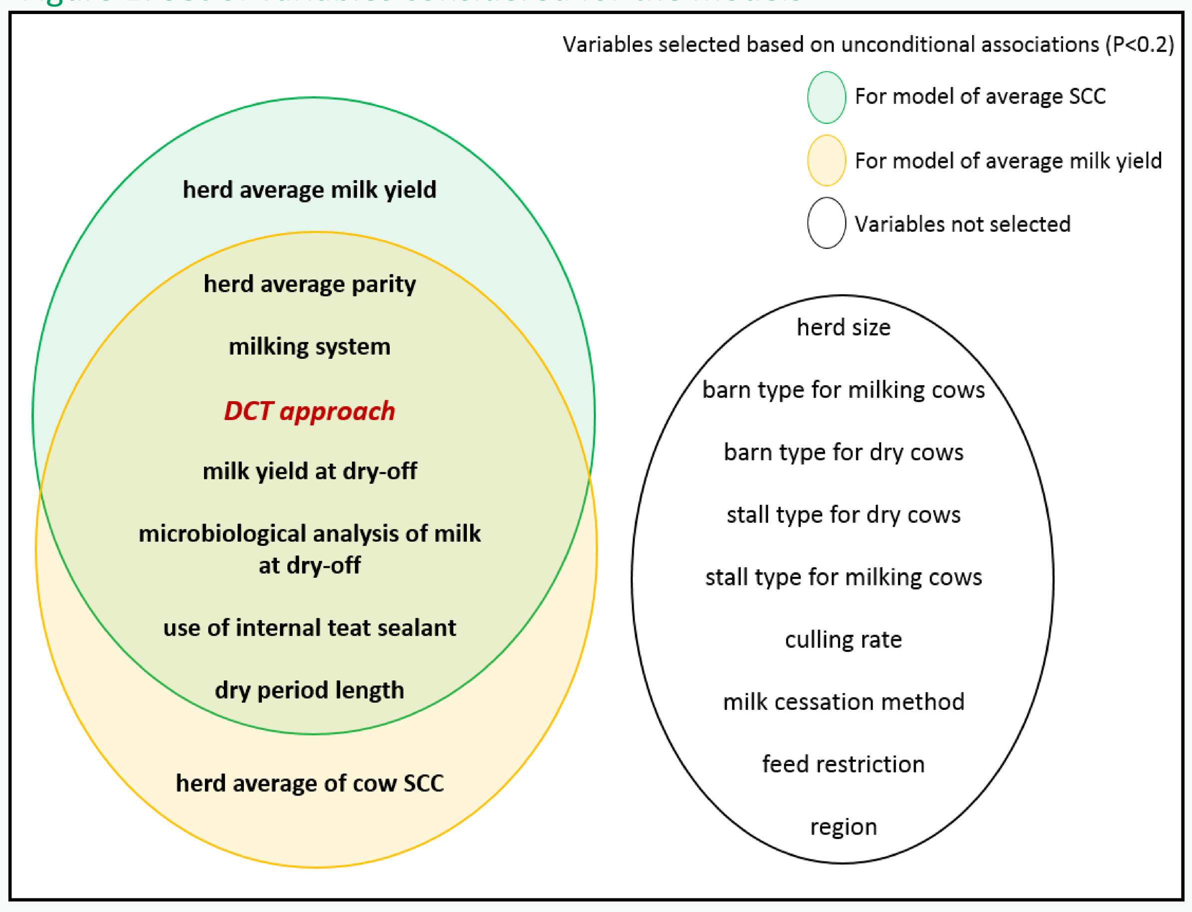

Table 1. Descriptive statistics from 2016 of farms included in the analyses

	SDCT farms (n=192)			BDCT farms (n=35)		
	Mean (SD)	Min	Max	Mean (SD)	Min	Max
herd size [a]	49.5 (36.5)	13.0	314.7	77.9 (60.6)	15.4	254.7
herd average SCC (x1000 cell/ml)	160.7 (57.7)	36.0	336.0	162.9 (69.1)	49.0	316.0
herd average milk yield (kg/y) [a]	9693.9 (1050.8)	6693	12486	10091.4 (887.9)	7797	11600
average parity [b]	2.5 (0.4)	1.7	4.3	2.4 (0.3)	1.8	3.4
milking system [b]	Number (%)			Number (%)		
pipeline	95 (50.0)			10 (28.6)		
AMS	41 (21.6)			16 (45.7)		
parlour	54 (28.4)			9 (25.7)		

Comparison between SDCT and BDCT farms (P<0.05): [a]t-test, [b]Chi-square test.

Table 2: Model estimates for annual average SCC (x1000cell/ml) at herd level

Variable	Category	Coef.	SE	t	P-value	95% CI	
Intercept		253.29	37.95	6.68	0.000	178.50	328.09
DCT approach	BDCT	-7.01	11.05	-0.64	0.526	-28.79	14.76
	SDCT	0					
herd average milk yield (1000k/y)		-8.48	3.80	-2.23	0.027	-15.96	-0.99
parity	≥ 2.5	8.46	7.80	1.09	0.279	-6.90	23.83
	< 2.5	0					
milking system	pipeline	-26.44	9.03	-2.93	0.004	-44.24	-8.64
	AMS	26.56	10.92	2.43	0.016	5.03	48.08
	parlour	0					
microbiological analysis of milk at DO	yes	-8.58	9.66	-0.89	0.375	-27.61	10.45
	no	0					

Table 3: Model estimates for annual average milk yield (kg/year) at herd level

Variable	Category	Coef.	SE	t	P-value	95% CI	
Intercept		9938.05	235.45	42.21	0.000	9474.03	10402.07
DCT approach	BDCT	232.48	185.40	1.25	0.211	-132.91	597.88
	SDCT	0					
herd average SCC (1000cell/ml)		-2.70	1.17	-2.31	0.022	-5.00	-0.39
milking system	pipeline	49.32	160.05	0.31	0.758	-266.11	364.74
	AMS	757.12	183.30	4.13	0.000	395.88	1118.37
	parlour	0					

REFERENCES

[1] Rajala-Schultz et al., 2019. Vet Rec. 184: 29-30
[2] Santman-Berends et al., 2016. J Dairy Sci. 99:2930-2939
[3] Scherpenzeel et al., 2016. J Dairy Sci. 99: 3753-3764
[4] Rajala-Schultz et al., 2011. J Dairy Sci. 78: 489-499
[5] Bradley et al., 2010. J Dairy Sci. 93: 1566-1577
[6] Cameron et al., 2015. J Dairy Sci. 98: 1-10
[7] Vilar et al., 2018. J Dairy Sci. 101: 7487-749316
[8] Hovinen et al., 2009. J. Dairy Sci. 92: 3696-3703
[9] Tse et al., 2018. Animal. 12: 2649-2656

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