Efficacy of homeopathic preparations of autogenous mastitis causing organisms in the prevention of mastitis in dairy cattle

Fernando Moncayo DVM MSc
Alan Fredeen PhD PAg

Robert Banks
Peter DeNuke
Alan Jackson

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The original proposal included two experiments: 1) a double blind on two farms (the Nova Scotia Agricultural College dairy herd and Herman Mentink's herd); 2) a testing of the homeopathic preparation vs antibiotic in three commercial dairy herds, Banks', Jackson's and DeNuke's.

The double blind experiment was not carried out. The Nova Scotia Agricultural College withdrew the offer of the dairy herd for the project. Mentink's herd was withdrawn because the farmer had second thoughts and proposed to include in the experiment only cows that had a low Somatic Cell Count; this would invalidate the results.

Therefore, the project was modified and consisted of the following parts:

I. Comparison of a homeopathic preparation (nosode) of autogenous mastitis causing organisms to dry cow antibiotic formulas for the prevention of mastitis in dairy cattle in three commercial dairy herds.

II. Evaluation of the effect of homeopathic therapy on the SCC of lactating cows in one commercial dairy herd.

III. Treatment of chronic mastitis in lactating dairy cows (Case report).

Part I: Comparison of an autogenous mastitis nosode to antibiotic as dry cow treatment for the prevention of mastitis.

Materials and Methods

Herds

Three commercial dairy herds located in the Annapolis Valley of Nova Scotia (Canada) were used: Banks', Jackson's and DeNuke's. All herds had fixed stall systems with housing from November to May and grazing from June to November. All herds used milk pipe milking systems where cows are milked on the extensions twice daily. Hygiene methods were standard with pre and post milking teat dipping. Banks milked between 90-100 cows, DeNuke and Jackson milked 25-30 cows. All three farms milked cows year round.

Autogenous Nosode

The California Mastitis Test (CMT) was conducted on all cows and milk samples were taken from those that tested positive. Samples were submitted for culture and sensitivity to the Provincial Veterinary Pathology Laboratory. At the lab, cotton swabs were impregnated with isolated bacteria and were placed in a glass tube containing ethanol and ultra distilled water 50/50 by volume. The tubes were sealed and left undisturbed for 7 days.

Afterwards, tubes belonging to the same farm were combined and used as the mother tincture (MT) which was processed as follows:

1) 0.01 ml of the MT were added to a glass test tube containing 10 ml of ultra distilled water; 2) the tube was forcefully shaken (succussed) by hitting its bottom 100 times on a hard cover book; 3) 0.01 ml were withdrawn from this tube and added to a second tube containing 10 ml of ultra distilled water; 4) the second tube was succussed 100 times; 5) 0.01 ml were withdrawn from the second tube and added to a third tube containing 10 ml of ultra distilled water; 6) the third tube was succussed 100 times; ... The steps of dilution and succussion were repeated 29 times. Finally, 0.04 ml were withdrawn from the 29th tube, added to an amber glass bottle containing 40 ml of ethanol/ultra distilled water 80/20 by volume, and succussed 100 times. The bottle was labeled with the name of the farm and the organisms included in the solution and used as the base solution from which the medication administered to the cows was prepared. The base solution was kept in a dark cupboard away from other medications and electric devices.

Throughout the experiment, new succussed bacteria solutions derived from mastitis cases and cows that presented persistently high SCC were added to the base solution. Additions were made when a new organism was isolated or when an ancient organism presented a new antibiotic sensitivity profile.

The solution for administration to the cows was prepared by adding 0.04ml of the base solution to an amber glass bottle containing 40 ml of ethanol/ultra distilled water solution 20/80 by

volume and succussion of the bottle 100 times. This formulation was given to the farmers and replaced monthly when not used entirely.

Treatment groups

Cows were divided in two groups that were balanced for number of lactations and history of mastitis as much as possible. By the toss of a coin the groups were allocated to either Antibiotic (A) or Nosode (N) treatment. This was done monthly from the expected calving list and for each farm.

Cows in the A group were treated with a dry cow antibiotic formula of common use: Cephapirine benzathine (Cefa-Dry-Ayers) for most cows; or Cloxacillin benzathine (Dry Clox-Ayers) when it was determined that the cow was infected with *Staphylococcus aureus.*
Cows in the group N were given 2 ml of nosode in the feed every other day during two weeks after the drying-off and during two weeks before the due date and for two weeks after calving.

Measurements

Data for Somatic Cell Count (SCC) were collected from the monthly reports of testing done by ADLIC (Atlantic Dairy Improvement Centre). The variable of interest was the SCC on the first testing postpartum.

Statistical Analysis

Data for SCC was transformed to the logarithm and Analysis of Variance was performed to test for the effect of treatment, farm and interaction of farm and treatment.

Results and discussion

The organisms isolated and included in the nosode were:

DeNukes: *Staphylococcus aureus, Staphylococcus epidermicus, Streptococcus dysgalactiae*

Banks: *Staphylococcus aureus, Staphylococcus epidermicus, Streptococcus dysgalactiae, Streptococcus agalactiae Bacillus spp, Klepsiella spp.*

Jacksons: *Staphylococcus epidermicus, Streptococcus dysgalactiae, Staphylococcus aureus*

A total Of 48 cows were included in the trial that extended from October 1999 to July 2000. Twenty-four cows were treated with antibiotic and 24 were treated with Nosode.

SCC for all cows included in the trial is presented in Table 1. A descriptive statistic of the data is found in Table 2.

The number of observations made during this year constitutes a small sample where significant differences may not be detected. The analysis of variance indicated that there were no significant differences in the SCC between treatments but that there was a significant farm effect (P=0.093). Figure I visualized the farm effect. The farm effect is even more significant considering the small sample size. Lower SCC were observed at DeNuke's and Jackson's.

There were very few cases of clinical mastitis encountered. Banks reported two cases for each treatment group; DeNuke reported two cases for each treatment group; Jackson did not report any clinical cases. These data are insufficient to be analyzed. Farmers confirmed that, in their perception, clinical mastitis was not a problem. They were more concerned with cows that presented a persistently high SCC.

Conclusion

This study did not detect any differences in the SCC in the postpartum in cows treated either with antibiotic or nosode. The farm seems to be a very important factor in the level of SCC. A larger sample size is required to draw a more solid conclusion regarding the comparative efficacy of an autogenous nosode in the prevention of mastitis in the postpartum.

Comments of practical application

Farmers perception on the efficacy of the nosode, and management styles seemed to be important factors on deciding whether to continue using the nosode. The treatment with nosode required that at drying-off cows were kept in the barn for two weeks, and were brought in the barn two weeks prior to the due date. As a result, the labour demands for the farmer increased.

Banks, who operates a relatively larger farm and shares management duties with three family member, felt that the nosode was not effective, was unpractical and would not continue using it. In contrast, Jackson and DeNuke who are the main managers operating small herds were satisfied and would consider using the nosode in the future.

PART 11: Effect of an autogenous nosode on the somatic cell count of lactating cows.

This study sought to determine whether homeopathic treatment had an effect on the SCC of lactating dairy cows.

Three trials were conducted. In Trial I, homeopathic treatment was compared to a combination of homeopathic and antibiotic treatment. In Trial II, homeopathy was compared to a untreated control; Trial III sought to replicate the effect observed in the Trial II. All trials were conducted at the Banks' farm in the Annapolis Valley of Nova Scotia.

Materials and Methods

Homeopathic treatment

Homeopathic treatment consisted of Sepia 30 C (10^{-60}) and Nosode at the 30 C (10^{-60}) potency.

Sepia is a homeopathic medication derived from Cuttlefish Ink. It was selected using the classical homeopathy method of prescription known as the *genus epidemicus* whereby a homeopathic medication required to treat a population afflicted by a common disease is selected based on the peculiar signs and symptoms observed in the population. The signs of homeopathic value observed at the Banks' that indicated Sepia were:

Edema in general: mammary edema was frequently observed in the early postpartum.

Obesity: there seemed to be a larger number of over-conditioned cows.

Ovarian edema: a significant number of cows presented very large ovarian cysts.
Disease is aggravated by rain: the SCC and incidence of clinical mastitis seemed to be higher during rainy periods.

Rich diet: cows were fed large quantities of grain and silage, which are rich, relative to the ruminant natural diet of grass.

Abscesses: high SCC is sign of suppuration in the mammary gland.

The nosode was prepared from organisms isolated from milk from the cows involved in the study. It was prepared manually following the process described in the Part I.

Both Sepia and Nosode were prepared separately in an 80/20 ethanol water solution which was added to white sugar (for household use) in a proportion Of 20 ml of medicine to 4 kg of sugar. The medicated sugar was mixed into 11 kg of crushed barley.

Posology
Cows were fed about 1 cup of medicated feed as follows: *Sepia* 30 for three days; no medication for 4 days; second Sepia 3o-treatment for 3 days; no treatment for 4 days; Nosode for 3 days; no treatment for 4 days; second Nosode-treatment for 3 days.

Cows

In Trial I 13 cows with SCC over 100,000 were selected and randomly allocated to two groups Of 7 and 6 cows. The group of 7 cows received homeopathic treatment. The group of 6 cows was treated with homeopathy as well as with the antibiotic cephapirin sodium (Cefa-Lak).

In Trial II 21 cows with SCC over 100,000 were allocated to two groups of 10 and 11 cows. Groups were balanced for number of lactations and history of mastitis. With the toss of a coin the groups were allocated to either homeopathic treatment or untreated control.

In Trial III 20 cows that had SCC over 100,000 were randomly allocated to two treatment groups namely homeopathic and untreated.

Data and analysis

Data for SCC were collected from the ADLIC reports using the analysis taken closest to before the start of and after the treatment. Data was transformed to the logarithm and the values before treatment were compared to the values after treatment using a paired t-test.

Results

In Trial I cows given homeopathic treatment experienced a decline in the SCC from a mean ± SE of l062.863±51.89 to 296.43±66.27; this decline was significant at the 0.108 level (Table 4). In contrast, the group treated with homeopathy and antibiotic experienced a mild increase from 2348.17±888.97 to 2929.83±1406.45; this difference was significant at the 0.381 level (Table 5).

In Trial II, both groups experienced a significant decline in the SCC. The SCC in the homeopathic treatment group declined from 1477.25±471.01 to 832.20±239.44 with a level of significance of 0.052. Similarly the SCC in the untreated control group dropped from 862.73±232.94 to 581.82±166.19 with a level of significance Of 0.041 (Table 6).

In Trial III the SCC of the treated cows declined from 1165±257.03 to 850.9±370.73 with a significance of 0.246. Meanwhile, the untreated control presented a decline in the SCC from 1016.00 ±533.69 to 842.20±513.38. The difference had a significance of 0.50 (Table 7).

Overall, pooling the data for cows that received homeopathic treatment for the trials, a very significant reduction is observed from 1254.56±213.33 (log: 6.76±0.18) to 699.81±165.61 (log:6.08±0.18); the means were different at a significance level of 0.006.

Similarly, the SCC in the control groups for trials II and III pooled together experienced a very significant reduction from 936.05±274.85 (log: 6.24±1.07) to 705.81±254.08 (log: 5.90±1.10) with a significance of 0.081 (Table 8).

Discussion

It was our objective to determine whether homeopathic treatment could help reduce the SCC at this farm. In Trial I it was decided not to leave any animal untreated since the SCC had been increasing and this represented an economic loss. Apparently, homeopathic treatment had the expected effect but there was no response when homeopathy was combined with antibiotic treatment. According to basic homeopathic principles, any substance with high medicinal power can potentially interfere with a homeopathic medicine. Antibiotics are strong medicine

compared to homeopathic remedies. Antibiotic failure in the treatment of high SCC was not uncommon at this farm.

The results of Trial II were unexpected since both treated and untreated cows experienced a significant reduction in the SCC. No management changes other than the treatment given to the cows was made, and cows had not yet been turned out to pasture. Some cows may have inadvertently received medicated feed from a neighbouring treated cow. It has been reported that in homeopathic provings in humans and animals individuals receiving placebo experience signs and symptoms of the remedy in experimentation. Hypothetically, by an unknown mechanism the effect of a homeopathic medicine can be shared by individuals living in close contact. However, Trial III did not replicate the results and a less significant difference was observed in the homeopathic group; the untreated group experienced an insignificant reduction in the SCC.

The individual trials were composed of small samples where statistical differences are more difficult to detect. When the data for all treated cows was pooled, the reduction in the SCC proved to be highly significant ($p=0.006$) suggesting that indeed the treatment had a real effect on reducing the SCC. The control groups for Trial II and III pooled also revealed a significant reduction in the SCC but the reduction in the treated cows was 13.5 times more significant. The three trials were slightly different which may invalidate the results of pooling the data. However, the highly significant differences detected in the SCC between before and after the treatment in the three groups treated with homeopathy suggests that the treatment effect was real.

Conclusion

Homeopathic treatment significantly reduced the SCC of lactating cows on the Banks' farm. Factors other than direct administration of homeopathic treatment might to be significant.

Part III: Homeopathic treatment of chronic mastitis in lactating dairy cows. (Case report)

At the DeNuke's farm several cows presented chronic mastitis manifested as persistently high SCC and periodic mild clinical signs e.g. swelling of udder, milk clots. A higher than usual incidence of mastitis had occurred in 1999 which was attributed to a change in the milking system and/or contamination from stagnant water. Several cows were treated during the summer 99 with antibiotic but the response had been marginal.

Initially, four cows that failed to respond to antibiotic were treated with homeopathic medicine with no success. Homeopathic remedies that have been recommended for mastitis treatment were used e.g. *Belladonna, Bryonia, Lachesis.*

However, homeopathic theory states that the treatment of chronic disease requires the use of medicines prescribed according to the individualizing characteristics of the disease and personality of the individual. Further, when various individuals in a population are afflicted by

a common disease, one remedy that covers the characteristics of the disease *(genus epidemicus)* as it appears in the population must be used.

It was decided to treat a group of cows with both 1) a remedy of the population and 2) a remedy of the individual.

Carbo Vegetabilis was chosen as the remedy of the population. This is a remedy prepared from charcoal. *Carbo Vegetabilis* was believed to suit the population because:

1. it is reported to be useful for treating mastitis in humans

2. it applies to chronically ill individuals who consume rich food difficult to digest. This may be analog to the feeding of concentrated grain to ruminants whose natural diet is grass.

3. it applies to diseases that are insidious and develop slowly.

Remedies of the individual were selected studying the characteristics of each animal according to classical homeopathy.

Dolly: Startles with sudden movements; docile, can be approached and touched; slim body with fine long bones.
Rx Phosphorus

Polka dots: tame, mild and calm character when she is outside, startles to sudden movements when she is in the barn.
Rx *Pulsatilla*

Lily: shows dislike at being touched; she is the leader of the herd.
Rx: *Aurum Metallicum*

Charity: generally tame in the barn but cannot be approached when she is outside; dislikes to be touched.
Rx: *Antimonium Crudum*

Treatment

Cows were treated with the following remedies in sequence

1: *Carbo Vegetabilis* 30c two doses (1 dose: 5-10 pellets) 12 hours apart repeated every three days for two weeks.
2: *Carbo Vegetabilis* 200C two doses 12 hours apart once per week for two weeks
3: Remedy of the individual: two doses twelve hours apart.

The medication was in the form of coated pellets. The dose was dissolved in 30 ml of water and sprinkled over the feed.

Results and discussion

Dolly, Polka dots and Lily presented a gradual decline in the SCC after the start of the homeopathic treatment. The SCC reached acceptable levels within two months. Dolly presented a sharp decline in the SCC but it soared again to pretreatment levels after 3 months. Then, it was treated with antibiotics resulting in a sharp decline in the SCC. Charity did not appear to respond to treatment and it was culled (Table 9, Figure 2).

Three of the four cows receiving the treatment exhibited the desired effect. It is interesting that one of the cows that responded temporarily to treatment responded rapidly to antibiotic treatment when antibiotic alone had failed.

This was a very small sample of animals and does not intend to be proof of efficacy but an encouraging first approach to a modality of treatment that might be useful for organic dairy farmers.

General Conclusions

An autogenous nosode of mastitis causing organisms seemed to be equally effective as dry-cow antibiotic therapy for the prevention of subclinical mastitis (as defined by the SCC).

Homeopathic treatment consisting of a herd remedy and an autogenous nosode of mastitis causing organisms reduced the SCC in lactating dairy cows.

Fernando Moncayo
RR #1 Paradise NS
BOS 1RO Canada
moncadam@glinx.com
902-584-3901

Table 1. Somatic Cell Count within the first moth post-partum of cows treated with either Nosode at the drying-off and ealry post-partum or antibiotic at the drying off

	Nosode		Antibiotic	
Banks	SCC x1000	SSC log	SCC x1000	SCC log
	45	3.81	38	3.64
	670	6.51	131	4.88
	92	4.52	821	6.71
	1588	7.37	721	6.58
	47	3.85	31	3.43
	349	5.86	1423	7.26
	77	4.34	3274	8.09
	2654	7.88	115	4.74
	60	4.09	27	3.3
	478	6.17	223	5.41
	89	4.49		
DeNuke				
	21	3.04	897	6.8
	21	3.04	3876	8.26
	21	3.04	144	4.97
	65	4.17	36	3.58
	43	3.76	130	4.87
	298	5.7	123	4.81
	172	5.15	19	2.94
	32	3.47	168	5.12
	697	6.55	73	4.29
Jacksons	5	1.61	26	3.26
	40	3.69	18	2.89
	26	3.26	56	4.03
	2256	7.72	219	5.39
			86	4.45

Table 2. Description of data of SCC

Farm	Nosode		Antibiotic	
	SCC x1000	Log SCC	SCC x1000	Log SCC
Banks				
Mean±SE	559±251.5	5.35±0.44	680.4±323.04	5.4±0.54
Range	2609		3247	
Standard Deviation	834.12		1012	
Observations	11		10	
DeNuke				
Mean±SE	152.22±74.91	4.21±0.43	607.33±418.27	5.07±0.54
Range	676		3857	
Standard Deviation	224.74		1254.8	
Observations	9		9	
Jacksons				
Mean±SE	581.75±558.75	4.07±1.3	81±36.53	4±0.44
Range	2251		201	
Standard Deviation	1116.26		81.68	
Observations	4		5	

Table 3. Analysis of Variance of SCC (log)

Source	Sum of squares	Deg. of freedom	Mean squares	F ratio	Prob>f
Farm	12.63	2	6.31	2.51	0.09
Treatment	1.32	1	1.32	0.53	0.472
Interaction	2.1	2	1.01	0.4	0.673
Error	105.5	42	2.51		
Total	121.46	47			

Table 4. Somatic Cell count(SCC) and SCC log of cows given homeopathic treatment*

	Before**		After***	
	SCC	SCC log	SCC	SCC log
1	2872	7.96	115	4.74
2	407	6.01	594	6.39
3	328	5.79	294	5.68
4	1123	7.02	252	5.53
5	1517	7.32	87	4.47
6	201	5.3	427	6.06
7	992	6.9	306	5.72
Mean	1062.863	6.61	296.43	5.51
±SE	51.89	0.36	66.27	0.26

*From 29Jan00-29Feb00
**30 Dec 99
*** 7Mar00

t-statistic (paired before-after)	1.88
Significance	0.108

Table 5. SCC and SCC log of cows given homeopathic and antibiotic treatment

	Before*		After**	
	SCC	SCC log	SCC	SCC log
1	4168	8.34	2965	7.99
2	5147	8.55	9793	9.19
3	215	5.37	1317	7.18
4	384	5.95	909	6.81
5	670	6.51	1633	7.4
6	3505	8.16	962	6.87
Mean	2348.17	7.15	2929.83	7.57
±SE	888.97	0.56	1406.45	0.37

*From 29Jan00-29Feb00
*30 Dec 99
** 7Mar00

t-statistic (paired before-after)	-0.96
Significance	0.381

Table 6. SCC (x 1,000) and SCC log of cows before and after homeopathic treatment*

	Homeopathic treatment				Untreated control			
Statistic	Before**	Before(log)	After***	After (log)	Before**	Before(log)	After***	After (log)
1	4924	8.502	1755	7.47	2187	7.69	1893	7.546
2	197	5.283	109	4.691	436	6.078	206	5.328
3	2823	7.946	979	6.887	432	6.068	383	5.948
4	287	5.659	368	5.908	2463	7.809	350	5.858
5	826	6.717	761	6.635	771	6.648	1221	7.107
6	435	6.075	114	4.736	221	5.398	122	4.804
7	1289	7.162	495	6.205	301	5.707	178	5.182
8	2293	7.738	2374	7.772	137	4.92	117	4.762
9	1190	7.082	184	5.215	736	6.601	521	6.256
10	515	6.24	1173	7.07	951	6.858	865	6.763
11					855	6.751	544	6.299
Mean	1477.25	6.84	831.20.	6.26	862.73	6.41	581.82	5.99
±SE	471.011	0.33	239.44	0.35	232.94	0.27	166.19	0.28
t-statistic (Paired Before-After)			2.24		2.35			
Significance			0.052		0.041			

*From 13Apr00 to 6May00
**10Apr00
***11May00

Table7. SCC and SCC log of lactation cows before and after homeopathic treatment*

	Homeopathy				Untreated Control			
	Before**		After***		Before**		After***	
	SCC	SCC log	SCC	SCC log	SCC	SCC log	SCC	SCC log
1	1095.00	7.00	748.00	6.62	341.00	5.83	429.00	6.06
2	1412.00	7.25	381.00	5.94	259.00	5.56	487.00	6.19
3	172.00	5.15	639.00	6.46	120.00	4.79	148.00	5.00
4	629.00	6.44	458.00	6.13	5322.00	8.58	5418.00	8.60
5	1989.00	7.60	416.00	6.03	233.00	5.45	300.00	5.70
6	750.00	6.62	260.00	5.56	503.00	6.22	725.00	6.59
7	2010.00	7.61	4140.00	8.33	2622.00	7.87	141.00	4.95
8	503.00	6.22	725.00	6.59	472.00	6.16	600.00	6.40
9	2622.00	7.87	141.00	4.95	170.00	5.14	134.00	4.90
10	472.00	6.16	600.00	6.40	125.00	4.83	40.00	3.69
Mean	1165.00	6.79	850.80	6.30	1016.00	6.04	842.20	5.81
±SE	257.03	0.26	370.73	0.28	533.69	0.40	513.38	0.42
SD	812.80	0.84	1172.36	0.88	1687.67	1.26	1623.44	1.32
T value (Before and after SCC log)			1.24				0.70	
Significance			0.25				0.50	

*Treatment between 14Aug00 and 9Sep00
**10Aug00
***18Sep00

Table 8. Paired t-test of pooled data for SCC log of cows treated with homeopathy on trials

	Before Homeopathy	After Homeopathy
Mean	6.76	6.08
SE	0.18	0.18
SD	0.91	0.96
Degrees of Freedom	52	
t-statistic	3.01	
Significance	0.006	

Table 9. Paired t-test of pooled data for SCC log of untreated cows in trials II and III

	Before/control	After/Control
Mean	6.24	5.9
SE	1.07	1.1
SD		
Degrees of Freedom	20	
t-statistic	1.84	
Significance	0.081	