

Title:

Selenium survey on dairy farms in Belgium/Flanders: Looking at the possibility to evaluate the selenium status on a dairy farm by analyzing bulk

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Introduction: Selenium, together with vitamin E is of great importance for any mammal. Acting as an antioxidant, it plays an important role in supporting the immunity of the body, which needs selenium for the proper functioning of the enzyme glutathion peroxydase (GPX). Following a study performed in 2009-2010 investigating the selenium level in Belgian White Blue cattle, Veepeiler is now investigating the selenium level in dairy cattle in Belgium/Flanders. The link between selenium and animal health has already been proven in several publications.

Objectives: Given the fact that the main goal of the Veepeiler program is to provide support to the farmer and the vet, one of the main objectives of this study is to offer the farmers the possibility to learn something about the selenium status on herd level by **analyzing just one sample, a sample of bulk milk**. On the other hand, in a next step of this study, Veepeiler has checked the selenium level in bulk milk samples derived from more than 220 farms. A survey was conducted of these farmers.

Methods: The study has been carried out in **three phases**.
 In **phase 1** the correlation between the selenium level in blood and milk of individual animals has been evaluated.
 In **phase 2** 400 farms were asked to participate and fill out a questionnaire. Bulk milk has been sampled on these farms.
 In **phase 3** the results have been analyzed in correlation with the answered questionnaires.

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Results:

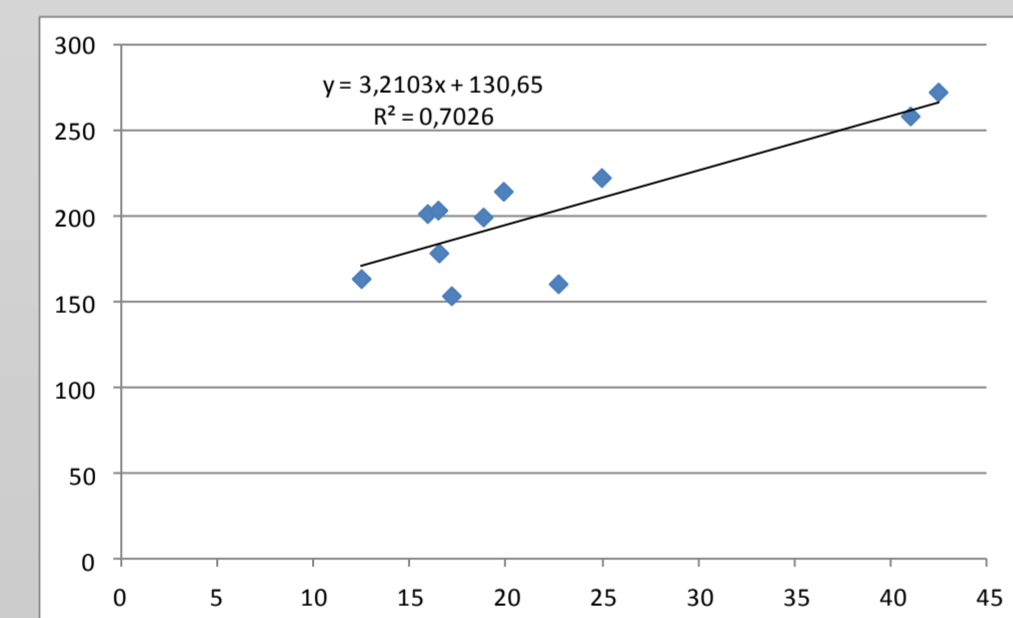
PHASE I

Correlation blood—milk:

A total number of 421 animals in different farms were sampled individually for blood and milk. Below table gives an overview of the average results in blood and milk per sampling round per farm in relation to bulk milk results:

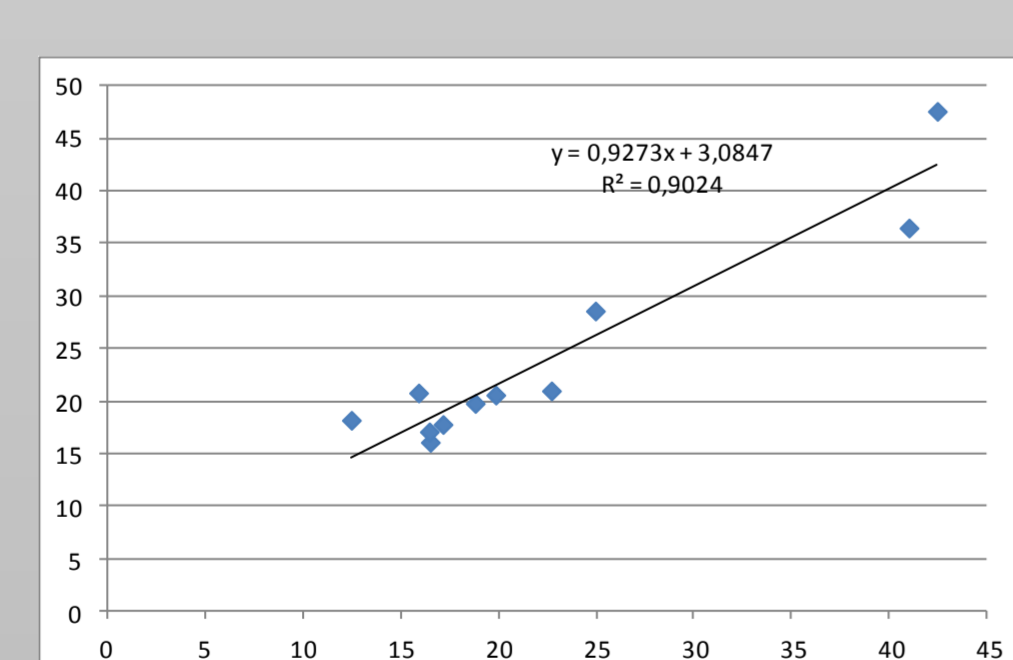
Farm	Sampling number	Average blood µg/kg	Average milk µg/kg	Bulk 1	Bulk 2	Average Bulk
Farm 1	1	223	28.6	23.9	26	24.95
	2	259	36.5	41.8	40.2	41
	3	273	47.6	44	40.9	42.45
Farm 2	1	179	16.1	15.8	17.2	16.5
	2	164	18.2	11.6	13.32	12.46
	3	154	17.8	16.9	17.4	17.15
Farm 3	1	202	20.8	15.7	16.1	15.9
	2	215	20.6	21.3	18.4	19.85
	3	200	19.8	18.5	19.1	18.8
Farm 4	1	161	21	24.1	21.3	22.7
	2	204	17.1	16.7	16.2	16.45

Looking for the correlation between blood individual average and bulk milk we could find a correlation $R^2 = 0,7026$, which is $R = 0.83$.



X= av. ind. blood µg/kg
 Y= bulk milk µg/kg

The correlation between milk individual average and bulk milk is even better: $R^2 = 0.90$ which is $R = 0.93$

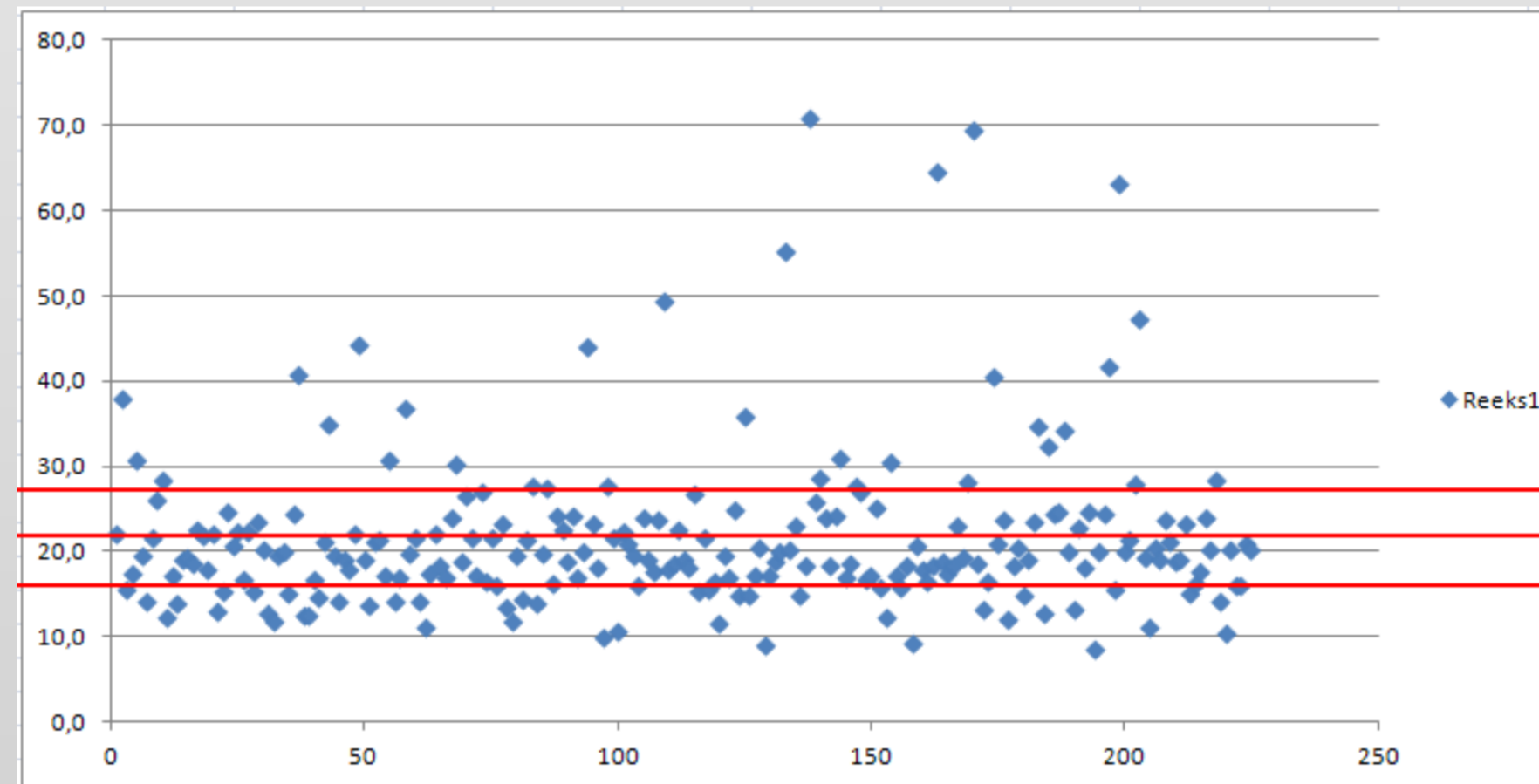


X= av. ind. milk µg/kg
 Y= bulk milk µg/kg

PHASE II

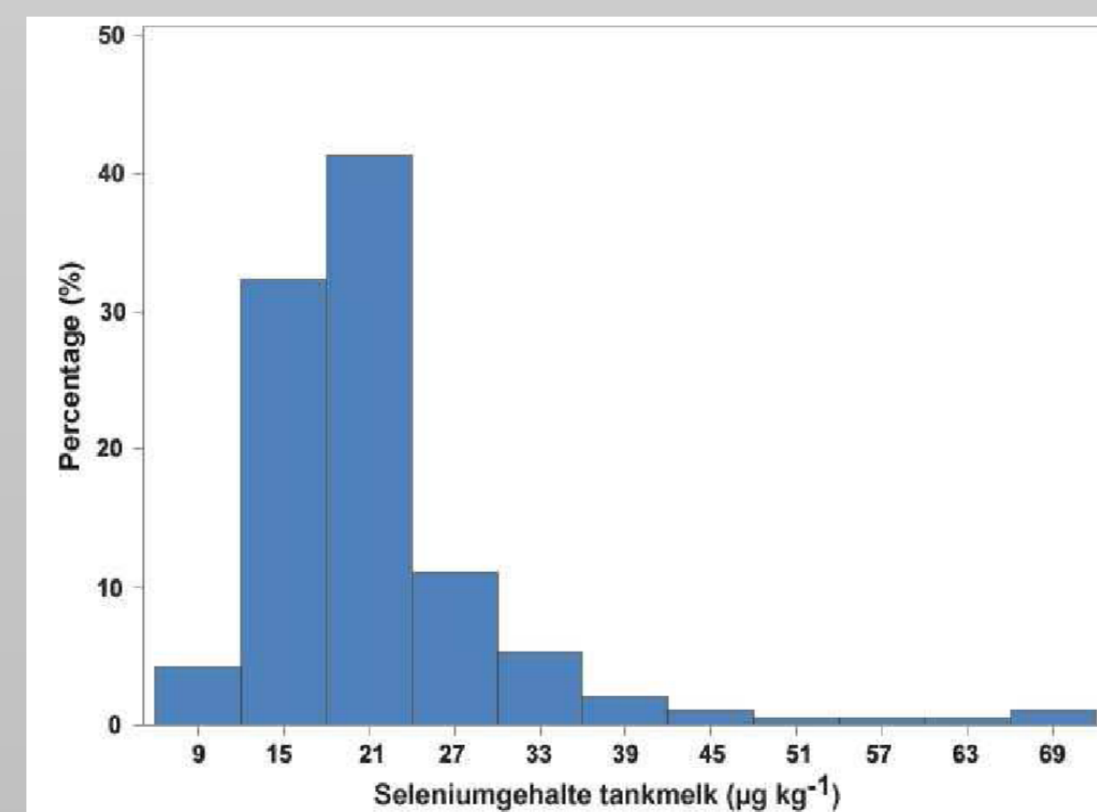
High and low bulk milk levels

227 farmers filled out the entire questionnaire. This is a response rate of 45 %. The highest concentration found in bulk milk was 70.8 µg/kg, the lowest 8.6 µg/kg. The average was 21.6 µg/kg. Average deviation of 5.94, max. 27.54 µg/kg and min. 15.66 µg/kg. 66% of the samples can be found between the average deviation. The average level found can be situated in the section high marginal according to the table below.



Ref. level bulk milk Witchel et al. (2004) µg/L*

Se level	interpretation	Se level	interpretation
< 9.6	deficient	> 15.7	high marginal
< 15.7	low marginal	> 21.8	sufficient

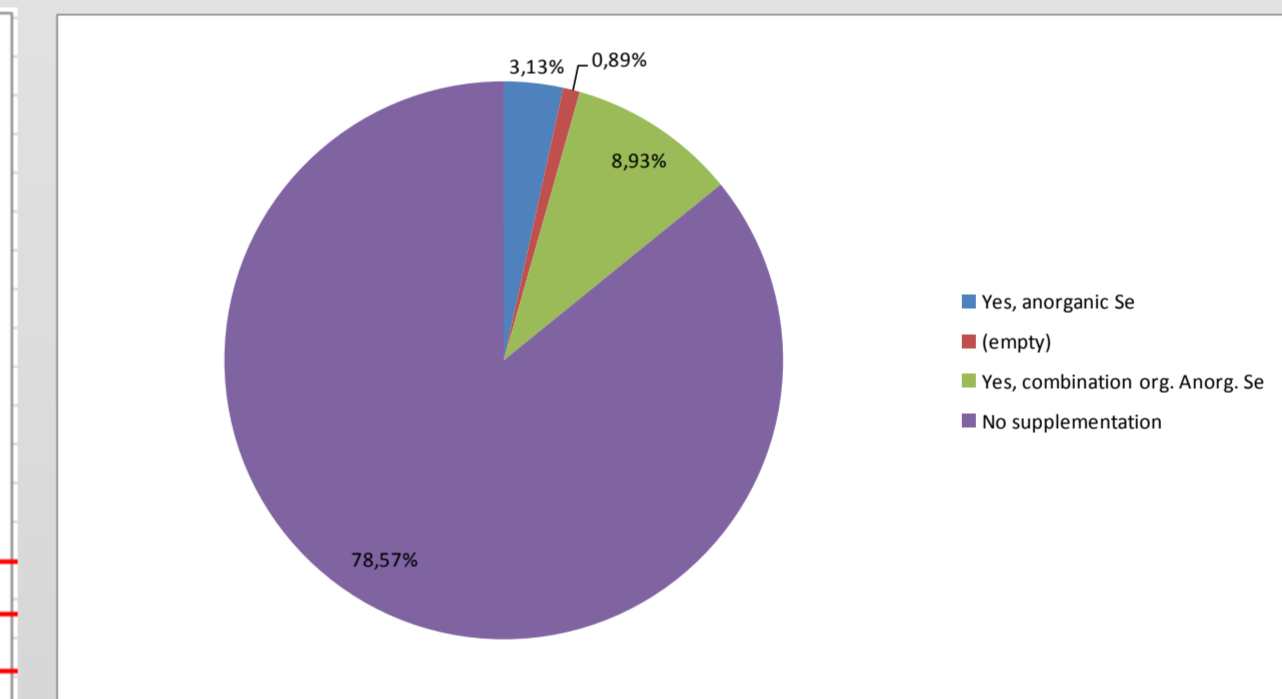


Selenium level in bulk milk, average and distribution, (n=189)

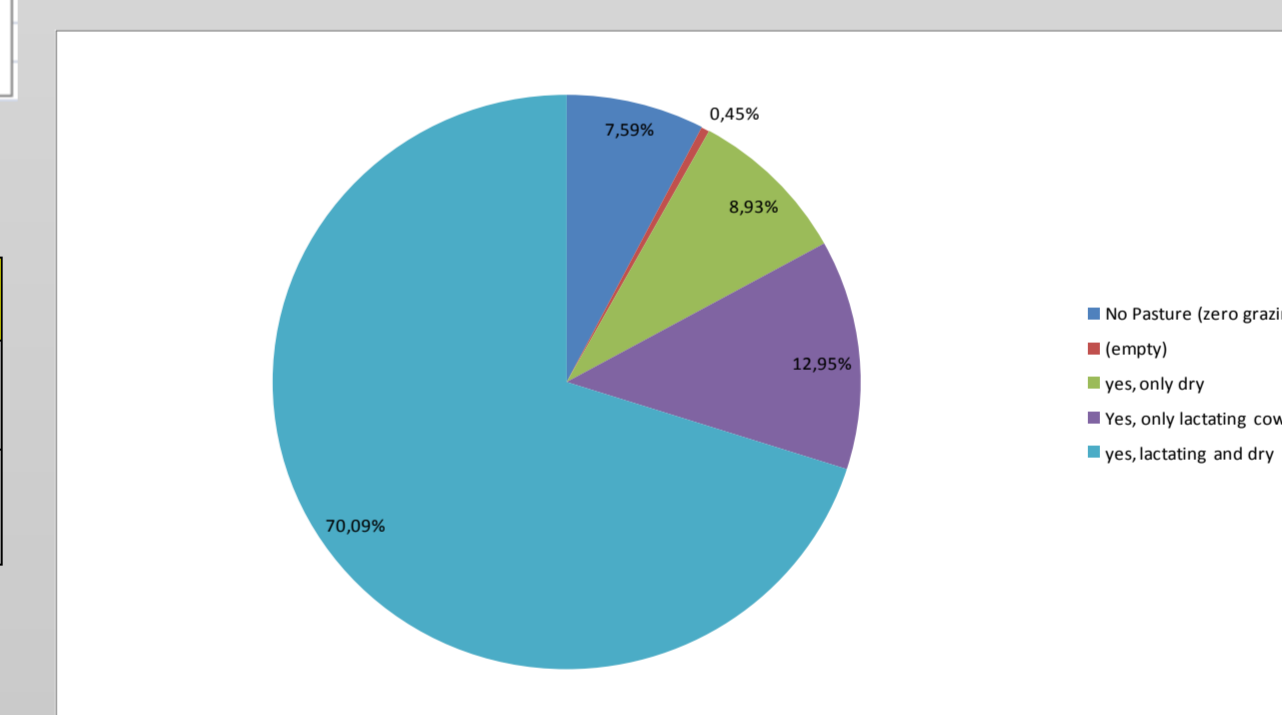
PHASE III

Levels in bulk milk in relation to questionnaire answers:

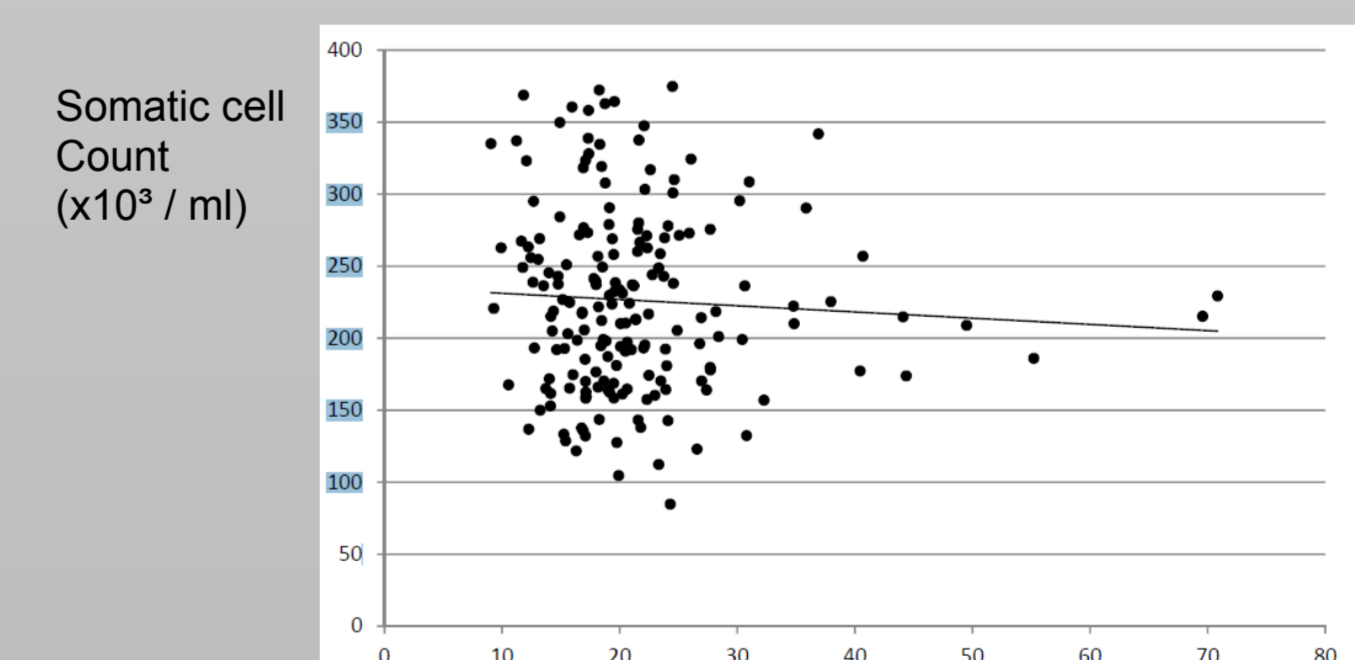
- 400 farmers were asked to fill out a web-based questionnaire. 224 did this in a correct way (all questions answered). This is a response rate of 56 %.
- The questionnaire contained 22 questions. Information was asked concerning the type of farm, ration, management and the possible ways in which and when selenium, if supplemented, was supplemented.
- Kind of supplementation selenium lactating cows:



Pasture:



Information concerning somatic cell count in relation to selenium: no correlation bulk milk Se—somatic cell count



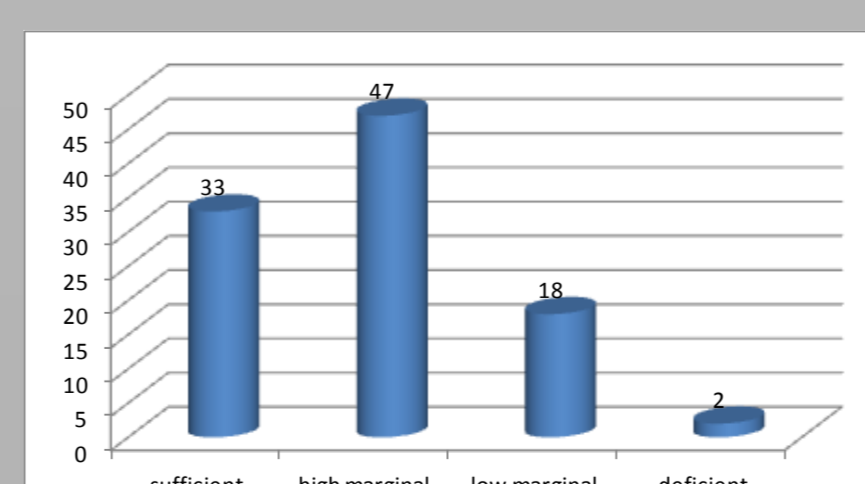
Conclusions:

Phase I:
Is it ok to analyze bulk milk for selenium? If there are more than 40 animals in the milking herd, a good correlation can be found between the average level in blood or milk individual and bulk milk. It is even better when taking an average of two samples of bulk milk analyzed at the same time.

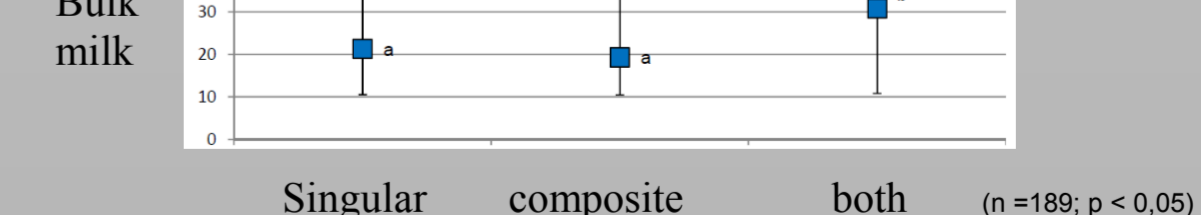


Phase II:
 The average selenium level in bulk milk on dairy farms in Flanders Belgium is 21.6 µg/L. According the ref. indicated by Witchel et al. (2004) the farms can be divided as follows:

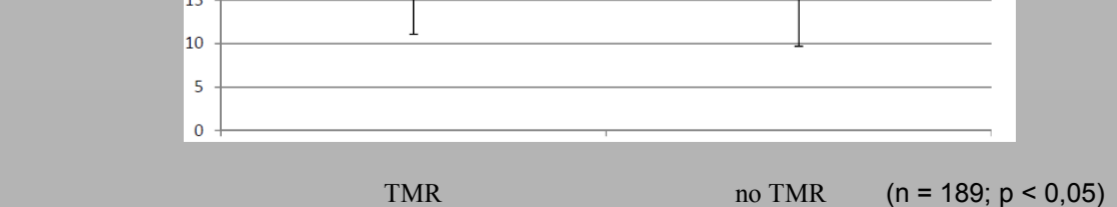
	N	%
sufficient	75	33
high marginal	106	47
low marginal	41	18
deficient	3	2



Farms where protein is administered in a combination form show a higher Se level.



Farms where TMR is administered have a significantly higher level of selenium in bulk milk.



These are the only correlations between the answers in the questionnaire and the selenium level in bulk milk that were found to be significant.

*µg/L = µg/kg