

Monitoring of the level of Se in beef cows in Flanders, Belgium



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Introduction

Selenium (Se) is a trace mineral that is essential for a good health, but required only in small amounts (1). Se is incorporated into proteins to make selenoproteins, which are important antioxidant enzymes. Some of these enzymes as glutathione peroxidase (GSH-Px) are involved in membrane integrity and play a major role in the antioxidant defence in the cell to prevent cellular damage from free radicals. These free radicals can contribute to the development of chronic diseases as cancer in humans. Other selenoproteins help to regulate thyroid function and play a role in the immune system (2). In ruminants Se-deficiency is associated with a variety of clinical and subclinical conditions, including myocardial and skeletal muscle necrosis, increased calf morbidity, reproductive inefficiency, mastitis, reduced weight gain, and pneumonia (3-7). Se deficiency may suppress the immune system and generally increase susceptibility to infectious disease (8, 9).

Se and, consequently, selenoproteins are vital players in dairy cow health and, eventually, human health through the transfer of selenium into milk and meat.

Objective

The purpose of this survey was to monitor Se-blood-level (individual and herd average) from a subset of beef and dairy cow herds in Belgium. Another objective of the survey was to determine whether there is a correlation between Selenium deficiency and calf mortality.

Material and methods

Blood samples from 44 randomly beef cow farms in Flanders were taken and analysed for Selenium. From each farm 10 blood samples (5 end of gestation heifers and 5 end of gestation cows) were taken. On farm mortality and number of calf born (indicator of fertility) were monitored on each farm over a two year period. In total, 427 blood samples (212 from heifers, 215 from cows) were collected.

The division of the respective Se concentrations was planned as follows:

Table 1: Classification of the measurements

Se-content (µg/l)	Status
< 50	Deficient
50-69	Marginal
70-80	Good

Results and discussion

The results of Se measurements are given in Table 2. It can be seen that beef cows are really very deficient in Selenium. The average was about 25 µg/l at farms only with beef cows and about 35 µg/l at farms with beef and dairy cows (so probably the farmer gives some of the dairy minerals to the beef cows, either by the concentrate or separate mineral mixture).

Table 2: Average blood serum Se concentrations on individual bases or average per farm

Se content (µg/l)	Status	Individual		Per farm	
		Heifers (n=212)	Cows	Heifers (n=44)	Cows
< 50	Deficient	83,5	84,2	90,7	84,1
50-69	Marginal	13,7	14,0	9,3	15,9
70-80	Good	2,8	1,9	0	0

Individual measurements showed that 83.5% of heifer and 84.2% of cow samples were severely deficient, 13.7% of heifer and 14.0% of cow samples were considered marginally deficient and only 2,8 % and 1,9 % had good Se-Status.

A linear graph was produced linking blood serum Se levels to calf mortality in heifers and cows (Fig. 1 and 2). Figure 1 shows a trend towards lower calf mortality by heifers with a better selenium status. In cows, this tendency is even more pronounced (Fig. 2).

Fig. 1: The link between blood serum Se levels and calf mortality in heifers

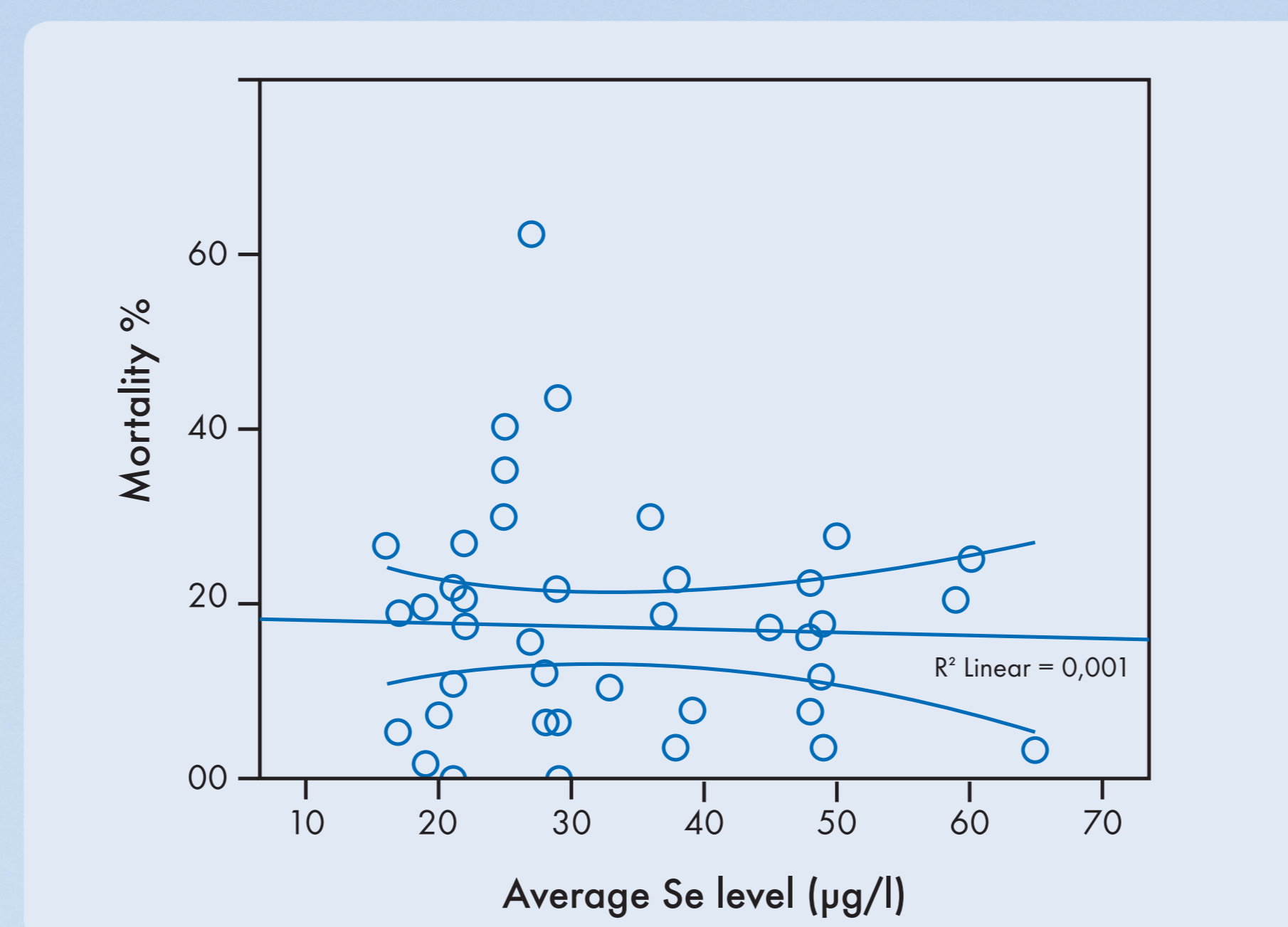


Fig. 2: The link between blood serum Se levels and calf mortality in cows

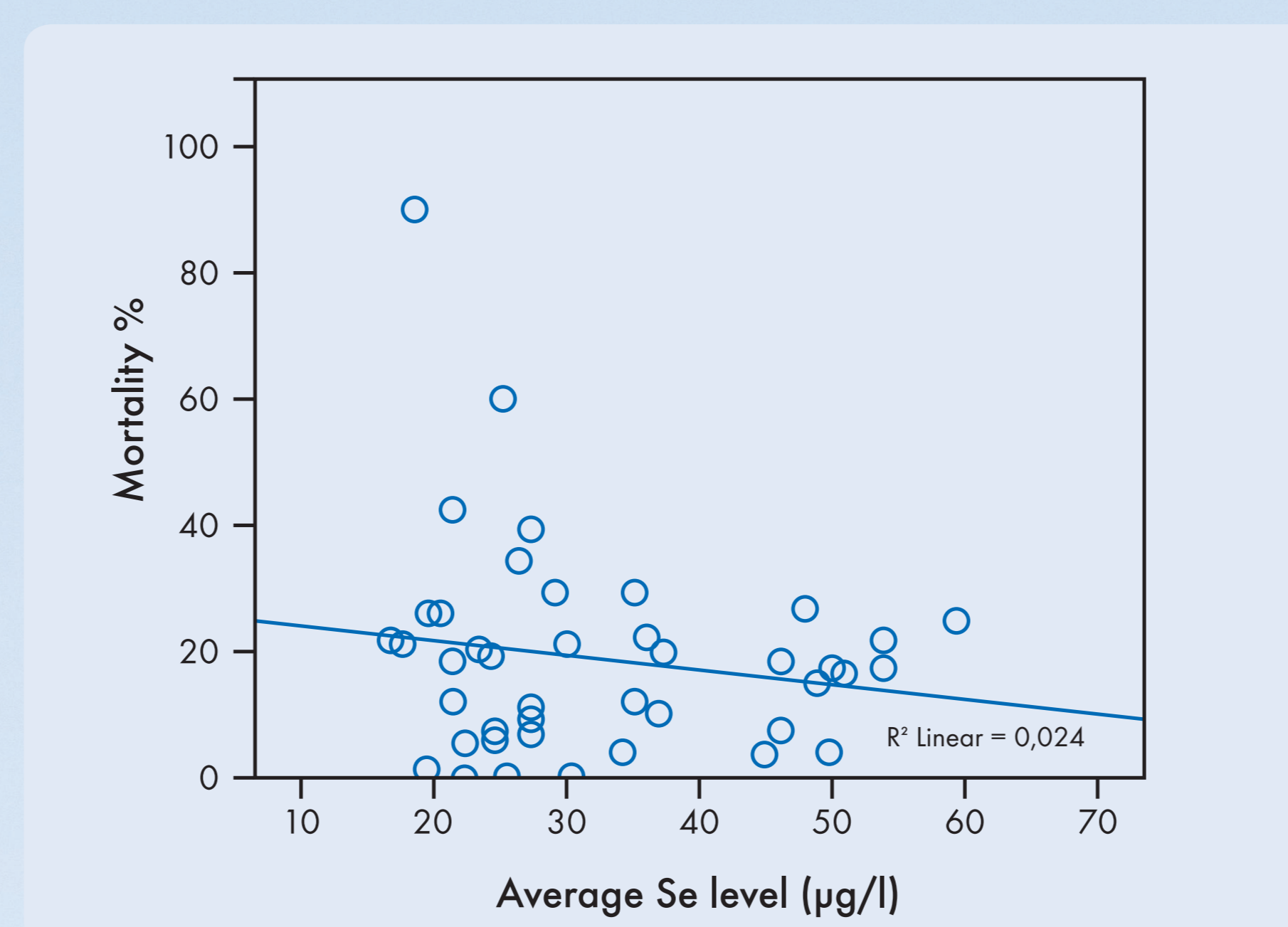


Figure 3 and 4 shows that farms with higher selenium deficiency have a higher mortality and a lower birth rate.

Fig. 3: The link between blood serum Se levels and number of newborn calves (% of total herd size) in heifers

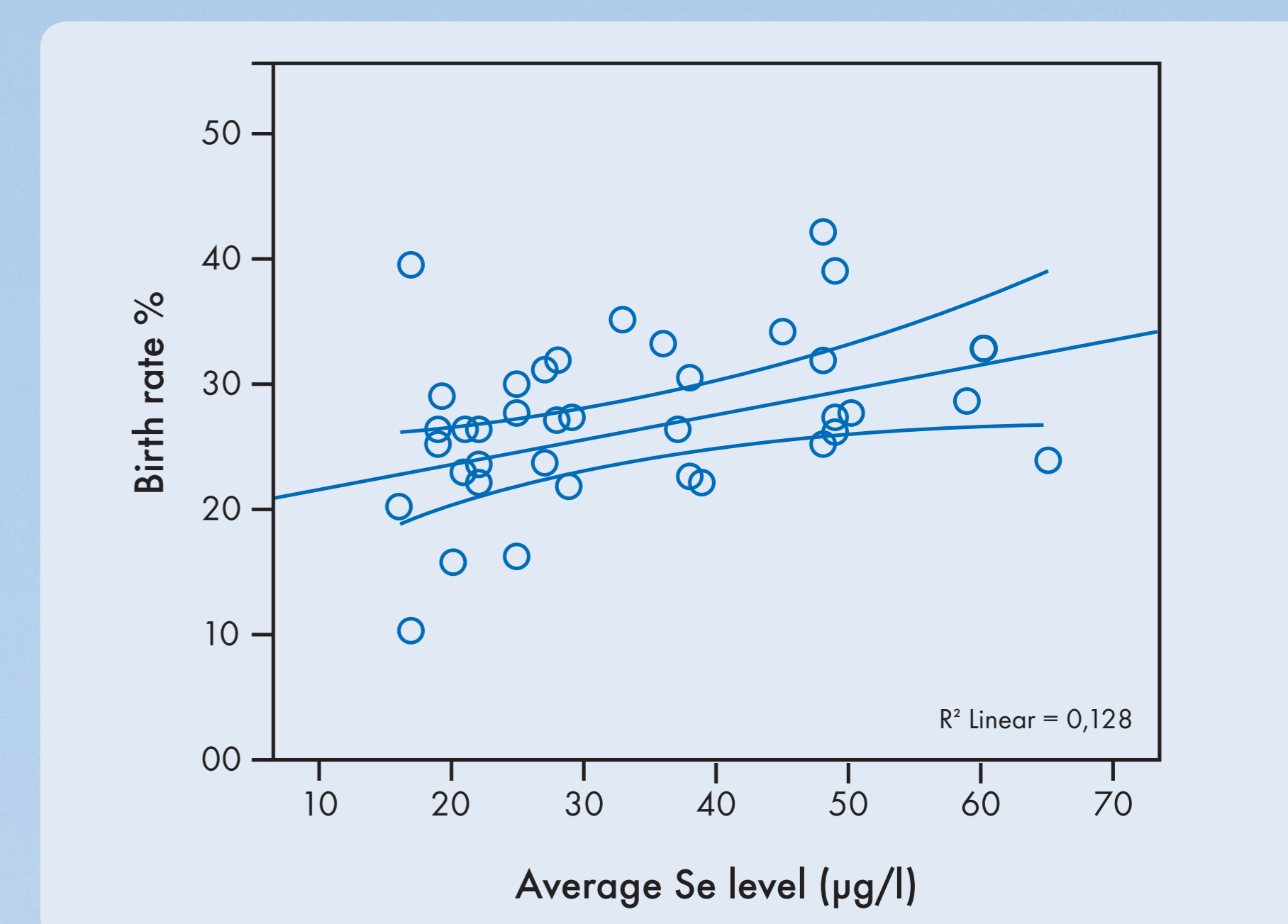
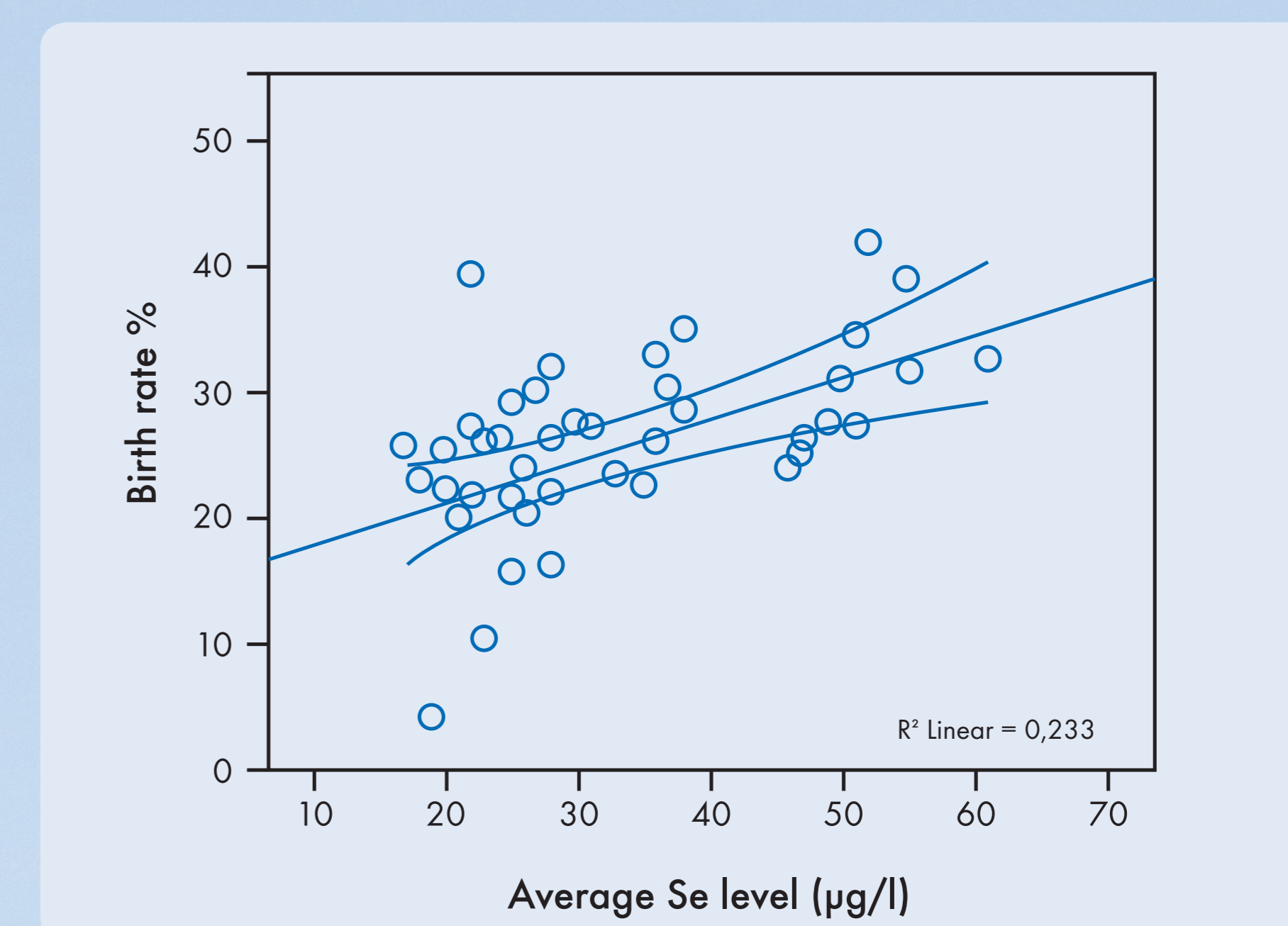


Fig. 4: the link between blood serum Se levels and number of newborn calves (% of herd size) in cows



Conclusions

This survey showed a clear deficiency of the Se-status in the majority of the selected Northern-Belgian beef cattle herds, when comparing this with reference Se-values in literature. A trend to a lower birth rate and a higher mortality rate in Se-deficient herds was observed, although a higher number of herds and more elaborate data are necessary to rule out any coincidence. A more extended study will be necessary to draw more clear and significant conclusions. Nevertheless, in Belgium regular monitoring of the Se status and adequate supplementation is advisable in Belgian Blue beef herds.

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