The effect of response behaviour on veterinary epidemiological studies

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Introduction

Cross-sectional studies are important instruments in veterinary medicine of populations[1,2,3,4]. They are used to investigate prevalences, infection status etc. within representative random samples of animals or herds. Among the selected members, there will be persons/farms, who refuse to participate in the study. In case, these individuals/farms show differences in the parameters of farm management, that are to be investigated, there will be a "selection bias" in the result of the study[5,6]. The possibilities of partial adjustment are presented considering a study on farm management on cattle farms in Lower Saxony, as example.

Method

A questionnaire was sent by post to a representative, randomly selected sample of 1,995 of 34,117 cattle farms in Lower Saxony. All Responders in this phase A were recorded (Responders). Five weeks later all non-responding farms were reminded via letter. Farms responding at this stage were assigned to phase B and identified as representatives of the Non-Responders. Adjustment for Non-Response-bias can be realised within a study population by a double-phase sampling design:

$$P_{adjust} = W \cdot P_A + (1-W) \cdot P_B$$ [7]

(P_A = prevalence in phase A; P_B = prevalence in phase B; W = response rate (Phase A))

From this adjustment the relative bias can be estimated for the choice of Phase A-data disregarding the Non-Response-effect:

$$Bias_{rel}\ (P_A) = (P_A - P_{adjust}) / P_{adjust}.$$

A χ^2-Test for homogeneity within a 2x2 table helps to compare Responders and Non-Responders concerning the equality of behaviour[6].

Results

Within the whole study period 799 questionnaires (40%) were sent back. 28.4% of the participants answered in phase A, 11.6% answered in phase B.

731 (36,6%) of the questionnaires were evaluated.

Fig. 1: Comparison of the response behaviour – regarding farm size and response period [in %]

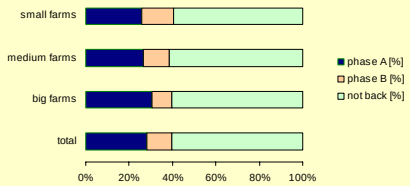
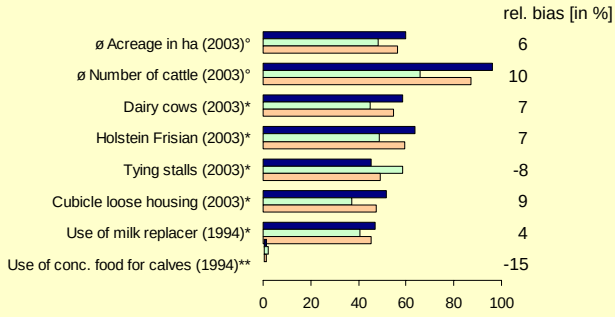


Fig. 2: Differences in the response behaviour between farms of various sizes; p-values in χ^2-test for homogeneity

	phase A	phase B	total
"small" vs. "medium"	0.3800	0.50	0.76
"small" vs. "large"	0.0011	0.01	0.22
"medium" vs. "big"	0.0400	0.06	0.42
total	0.0028	0.02	0.44

Fig. 3: Impact of Non-Response on the consistency of data



° = quant. value; * = proportion in %; ** = number of diff. producers per farm

phase A phase B adjustment

Small and medium sized farms showed in Phase A a statistically significant lower willingness to answer than large farms (see Fig. 2). Concerning the whole study period (phase A+B) there is no difference between farms of different sizes.

Non-Responders are smaller than Responders concerning number of cattle and acreage. They practise dairy farming with Holstein Frisian less frequently. Cows are more often housed in tying stalls. Calves are fed with milk replacer less frequently.

Discussion & Conclusion

Managers of small and medium sized farms were interested in the study, but due to forgetfulness, work overload etc. they did not participate immediately. **If Non-Responders are not included in the study, an exact estimation of parameter distributions is not possible.** A way of including a part of Non-Responders and minimizing bias is using reminding letters etc. **In all studies with a comparative study population – especially cross-sectional studies – a description and adjustment for Non-Response-bias should be made[8].**

References:

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