The muskrat (Ondatra zibethicus) is considered as an invasive species in the Netherlands. A muskrat control program is now conducted nation wide with the aim of eradicating the species. In the field, there are 10 trap types used to capture muskrats, which is sorted into body-grip trap, cage, fyke and others by their characteristics or active and passive traps depending on how professional trappers use them.

The study aims to investigate the trap efficiency in muskrat control program, based on field data from Flevoland, the Netherlands. The efficiency is discussed in three aspects namely catch efficiency, cost efficiency and target specificity. The relative catch number (number of catches/ km of waterway) in an atlas block in one period of four weeks is modeled based on trap densities of different trap types and external conditions. The best model contains trap densities of five most used trap types, year, historical catch (relative catch number of last year in same period) and their interaction with season. Within the best model, Duikerafzetting has the highest coefficient estimates in all seasons except spring. Schijnduiker has the lowest significant coefficient estimates throughout the year. Conibear has relatively similar coefficients in different seasons. Coefficient estimates for Lokaasklem and Lokaaskooi vary largely through seasons. Active traps have higher contribution to relative catch in summer and autumn and have similar coefficient with passive traps in winter. Fyke works most stable during the year. Cage has the highest coefficients in spring and winter and insignificant coefficients in other seasons. Body-grip trap contributes the most to relative catch in summer and autumn. In all models, the year 2017 has higher catches in all seasons. The historical catch only significantly positively related to relative catch in winter.

According to questionnaire about time spent on different traps, the Levend vangende kooi is checked most frequently by professional trappers (checked everyday). Conibear is mostly checked 2-3 times per week. Schijnduiker is usually checked once per three weeks or less. The other traps are checked in a relatively similar frequency. And it usually takes a trapper less than 10 minutes to check a trap. Total cost of using different type of trap was estimated against time spent in the field. Levend vangende kooi costs the most through time, followed by Conibear, Grondklem and Lokaasklem. The rest of trap types have relatively similar low cost with Schijnduiker having the lowest. Considering the total number of catches made by different trap types through the whole study period and corresponding checking cost estimate, Duikerafzetting has the highest catch and cost ratio. Overall most of trap types have similar catch and cost ratios.

Only four out of ten trap types caught non-target animals namely Schijnduiker, Lokaasklem, Duikerafzetting and Conibear. Lokaasklem has the highest by-catch rate of 0.2 (one non-target animal caught when capturing every 5 muskrats). Most of the by-catches are widely accepted by social public such as brown rat and European water vole. However, Duikerafzetting only caught fish as by-catch which is less accepted by the public. Moreover, Different trap types have selective trends on species of by-catches they made, as they usually have different working scenario and environment.
The field experiment shows that Conibear trap has higher catch ability than two passive traps: Lokaasklem and Lokaaskooi. The result of simulated experiments suggests the catch probability of Lokaaskooi is statistically significantly higher than the catch probability of Lokaasklem.

To conclude, Duikerafzetting is considered the most efficient among 5 most used trap types. Yet it is also found to have less ability to specify the target species. Catch efficiency varies among different trap types, years, historical population conditions and these factors perform differently among seasons. However, clear pattern of efficiency changes in migration season is not found.

It is suggested that the seasonal variation of catch efficiency for trap types and potential danger traps may cause to non-target animals can be taken into account when making trapping strategies. Also the data collecting and storage system needs to be upgraded. The status change is recommended to be recorded and the by-catches should not be removed when the corresponding trap is deleted. More precise and detailed analysis can be conducted in the future if these improvements are made and the performances of different traps, muskrat population can be further monitored using the data.