Fipronil-crisis in the Netherlands:

An analysis of the financial effects of the chosen approach (detoxicate or prematurely cull hens) by farmers during the fipronil-crisis in the Netherlands

Job de Lange
Wageningen University & Research
Jobdelange @hotmail.nl

ABSTRACT

The fipronil-crisis that occurred in the Netherlands in 2017, had a big impact on the poultry sector. Farmers had to make the decision to either detoxicate (a diet which attempts to eliminate the fipronil which is stored in the fat) or prematurely cull their hens. This research compares detoxification and prematurely culling in a financial way, to provide an answer for the question: Which approach would have restrained, with hindsight, the financial impact for the famers the most? In order to do this a decision tree has been built and a sensitivity, break-even and risk analysis have been conducted.

Keywords
Fipronil, Financial Impact, Detoxification, Prematurely culling.

INTRODUCTION

The fipronil-affaire that occurred during the summer of 2017, caused a big crisis in The Netherlands. 793 contaminated farms were blocked, and consequently farmers had to make the decision to either detoxicate or prematurely cull their hens in order to eliminate the fipronil contamination. The problem in this case was the high uncertainty regarding which of the two approaches (detoxicate or prematurely cull) would harm the farm the least in a financial way.

Research questions

This research provides an analysis of the financial effects of both approaches for the free-run, free-range, organic and colony farm sector. This analysis is based on the following research questions:

1. What are the options for farmers to eliminate the fipronil contamination at the farm and what are their costs and effectiveness?

2. Which approach was, in hindsight, the best to apply for the farmers in a financial way?

3. Would the results remain the same if certain variables change? For which values of these variables, there appears a break-even situation for the farm?

4. What influence has the risk-attitude of the farmer on the final decision?

Research material & methods

A literature study is conducted to describe the options for farmers and the costs and effectiveness of both approaches. In order to analyse which approach would have restrained the financial harm for the farmers the most, a decision tree is built with the program Tree Age Pro. In this decision tree the expected monetary values of the two different approaches and their possible scenarios are calculated and compared.

A simplified outline of the decision problem including options and scenarios can be found in *Figure 1*. The point of analysis was at both the main decision moment as well as after a failed detoxification process (second decision moment). By doing a sensitivity analysis, the sensitivity of both approaches for changes in the most influential variables was analysed. The break-even analysis shows at which values of these important variables the farmer is indifferent about the decision between the two approaches. A final analysis was made on the risk-attitude of the farmer, via the maximin, maximax, and regret criteria.. The maximin criterion implies that the most pessimistic outcome (in this case *fully blocked*) will always happen. Under that assumption the decision-maker should always choose the best pay-off. The maximax criterion is exactly the opposite, the most optimistic outcome (in this case *free*) will occur and the decision-maker should choose the best pay-off under this assumption. The regret criteria is used to calculate the value of the regret (expressed in terms of money), when the option chosen by the decision-maker appears to be not the optimal one. The different expected values are compared and the difference between the expected value of the chosen option and the optimal option is called the value of regret. (Drury, 2014).

Figure 1: Simplified outline decision tree
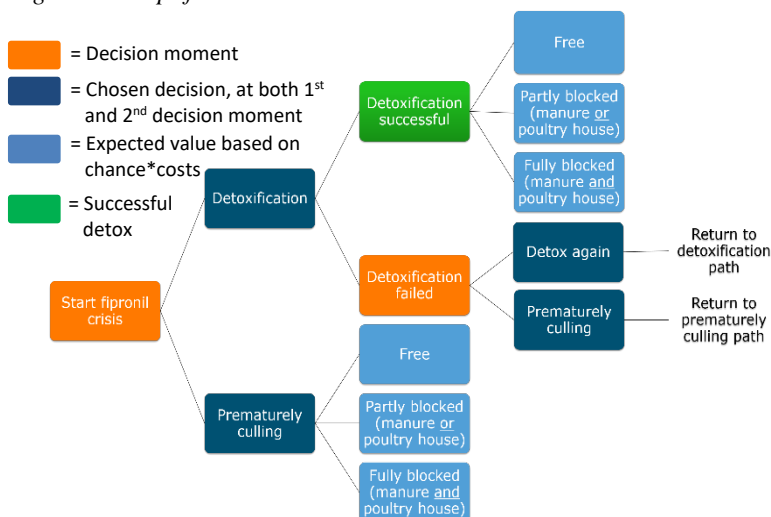
Results

The two options for the farmers are to either detoxicate or prematurely cull their hens, in order to eliminate the fipronil contamination. Both approaches cause several costs, for example the feeding costs during a detoxification, the loss of the slaughter value per hen for the prematurely culling decision, and the costs of vacancy due to not being able to destruct the manure and clean the poultry houses. These costs of vacancy apply to both approaches. Next to the costs, both approaches also cause uncertainty for the farmer. The chance of success is uncertain for both options, which causes a risk for the farmer. A wrong decision could lead to higher costs, which could be fatal for the company, financially speaking. The main problem for the farmers in this crisis, was the uncertainty regarding which approach would harm their company

The decision problem consists of two decision moments, the main decision moment and the second decision moment. The main decision moment is at the start of the crisis, where the decision between prematurely culling and detoxification has to be made. The second decision moment appears when the hens are not clean after a detoxification. The farmer has to make the decision to either detoxicate his hens again after a failed first attempt, or to prematurely cull his hens after a failed detoxification.

The effectiveness of the detoxification is estimated based on the report of Van Horne et al. (2017). The probability that the hens are clean after a detoxification according to this estimation is 42.9% for the free-range sector, 52.2% for the free-run sector, and 60% for the organic and colony farm sector. Clean in this context means that the fipronil leaves the body of the hen, and that the amount of fipronil in the produced eggs is lower than the residual limit of 0.005 mg/kg (NVWA, 2017). The effectiveness of the cleaning of the poultry houses and the destruction of the manure is based on an article from the Ministry of Agriculture (Schouten & Bruins, 2017). Based on this article an estimation is made about the probability that a farm is *free*, *partly blocked* or *fully blocked*. The estimated probability that the farm is *free* is 36%, that the farm is *partly blocked* 48% and that the farm is *fully blocked* 16%.

The results of the decision tree analysis (See *Figure 2 below*) show that detoxification is the financially least harmful decision, at both the main decision moment as well as the second decision moment. The sensitivity analysis shows that the variables: *value per hen*, *feeding costs*, and *efficiency detox*, have an impact on the final decision. This impact might be small for the variables individually, but the multiple-way analysis shows if combined, they can have a bigger impact on the final decision. The variables *loss of revenue* and *number of hens* did not have an impact on the final decision. The maximin, maximax, and regret value criteria all show that detoxification is the financially least harmful decision for all sectors and decision moments, regardless of the risk-attitude of the farmer. For the organic sector at the second decision moment the differences in terms of money, between detoxification and prematurely culling, are smaller than for the other sectors. This might indicate that in this specific case the decision for detoxification is less robust. Not all results fitted in this format, but can be asked for upon request (see contact details above).

CONCLUSIONS

The main findings of this research are:

- Prematurely culling and detoxification, are the two options for the farmers to eliminate the fipronil contamination
- Both options cause several costs, such as feeding costs, loss of (slaughter) value per hen and the loss of revenue

- The effectiveness of detoxification, cleaning of the poultry houses, and destruction of the manure, was hard to discover, but estimations have been made based on Van Horne et al. (2017) and Schouten & Bruins (2017)
- Detoxification is the financially least harmful decision for all sectors and decision moments, according to the decision tree analysis
- The variables *value per hen*, *feeding costs*, and *efficiency detox* have an impact on the final decision, the combined impact is bigger than the individual impact. The variables *loss of revenue* and *number of hens* did not have an impact on the final decision.
- The risk-attitude should have no influence on the final decision, as all risk criteria show that detoxification is the financially least harmful decision for all sectors and decision moments

ROLE OF THE STUDENT

As I have seen the consequences of the fipronil-crisis in the Netherlands relatively close by, I decided to write my thesis about this topic. At the start of the research I had several brainstorm sessions with my supervisor Dr. Ir. Helmut Saatkamp and Dr. Ir. Monique Mourits, about how to translate this broad topic in a more focused bachelor thesis topic. My role in the research was conducting all information about the used approaches by farmers and their related effectiveness and costs. After this information was gathered, I build a default decision model which calculates the financially least harmful approach for all sectors. Afterwards I conducted a sensitivity, break-even and risk analysis to check if the results from the default decision model hold in all circumstances. Basically, I conducted the complete research, with guidance and feedback from Dr. Ir. Helmut Saatkamp and Dr. Ir. Monique Mourits.

SRC 2018, November 9, 2018, The Netherlands.

Figure 2: results running decision tree analysis for all sectors (weighted costs in euro)

	Prematurely culling	Detoxification	Prematurely culling after failed detox	Second detoxification after failed detox
Free-run	€243,631	€199,376	€266,431	€240,711
Free-range	€181,286	€154,707	€195,536	€178,211
Organic	€166,282	€136,540	€176,682	€167,998
Colony farm	€341,637	€277,156	€383,887	€349,762

REFERENCES

1. Blanken, K., Evers, A., & De Buisonjé, F. (Eds.). (2017). *Kwantitatieve informatie veehouderij 2016-2017 : KWIN 2.0*. Wageningen, Nederland: Wageningen Livestock Research.

2. Bens, H. (2017) Personal communication on December 25, 2017. Transcripts available upon request.

3. Counotte, G. (2017). Personal communication on December 11, 2017. Transcripts available upon request.

4. Counotte, G., Bouwstra, R., Ter Veen, C., & Wiegel, J. (2017). Fipronil: onderzoeken en bevindingen tot nu toe. Geraadpleegd op 14 december 2017, van https://www.poultryexpertisecentre.com/-/media/Aeres-Partnersite-PEC/Files/samenvatting-gd.ashx?la=nl-NL

5. Drury, C. (2012). Decison-making under conditions of risk and uncertainty. In C. Drury (Ed.), *Management and cost accounting* (8th ed., pp. 278-292). Hampshire, United Kingdom: Cengage Learning.

6. Informatie fipronil Notitie situatie fipronil incident in de pluimveesector d.d. 28 juli 2017. (2017, July 28). Retrieved December 5, 2017, from https://www.ltonoord.nl/afdeling/gelderse-vallei/van-het-secretariaat/informatie-fipronil.

7. Van Horne, P., Van der Meulen, H., & Wisman, A. (2017). *Indicatie economische gevolgen fipronil affaire voor de pluimveesector Op basis van beschikbare informatie voor zover bekend op 22 september 2017*. Retrieved from https://www.rijksoverheid.nl/documenten/rapporten/2017/10/20/indicatie-economische-gevolgen-fipronilaffaire-voor-de-pluimveesector.

8. NVWA (2017) Wat is de norm voor fipronil in eieren? Retrieved December 6, 2017, from https://www.nvwa.nl/documenten/vragen-en-antwoorden/wat-is-de-norm-voor-fipronil-in-eieren