

## Quality control of the workshops, the Danish approach

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### Summary

To fulfil European legislation, inspection of sprayers in Denmark started in 2014. The Danish Environment Protection Agency has authorised approximately 120 workshops with educated inspectors to carry out the inspections.

It was a priority to implement an IT solution to cover all inspection reports, data about the workshops and inspectors as well as all data on the inspection equipment. It was chosen to translate and modify the IT system SYS that has been developed and used in the Netherlands.

In SYS statistics from performed inspections by each workshop and each inspector can be compared with country average as regards repairs made during inspections. Statistics reports on workshop repairs are made on regular basis and these are discussed with inspectors and workshop managers during visits at the workshops. As types, brands, age and condition of sprayers differ between the sprayers inspected at different workshops there are often good reasons why number and type of repairs differ between workshops. The statistic report are however good for discussions with workshops.

### Introduction

The introduction of sprayer inspections and the first experiences in Denmark was presented at the 5<sup>th</sup> and the 6<sup>th</sup> Spise workshop (Fjelsted, 2014 and 2016). Inspection reports layout and further description of the IT system SYS are described as well in Spise workshop reports (Kole & Harasta, 2014 and 2016).

### Materials and Methods

From 2014 until July 2018 approximately 120 workshops have carried out 11,297 inspections. Of these 277 are mist blowers, 587 are greenhouse sprayers, and the rest are field crop sprayers.

### Control, guidance and support of workshops

The Danish Environmental Protection Agency (Danish EPA) has contracted an external company to carry out technical support of the workshops as well as to control and inspect the workshops and their testing equipment. This work in addition includes a hot-line service to answer technical questions as well as the use of the administrative system SYS. Also the company will visit the workshop once every second year. The Dutch company SKL including two Danish subcontractors has carried out this type of control and technical support of the Danish workshops since 2016.

### Workshop visits

During a workshop visit, SKL consultants will check if the testing equipment and facilities are OK. The purpose of physical visits is to ensure that the inspections are carried out evenly throughout the country and that the testing is carried out with accurate testing equipment. If possible irregularities are corrected right away and measuring equipment is calibrated. During the visit SKL will give guidance to inspection companies and distribute good practices between inspection companies. Any challenges in the inspection processes are discussed during the visits. Based on a sprayer present at the workshop or at a farmers address the inspection requirements known to cause difficulties by some inspectors are discussed with the inspectors of the workshop.

Prior to each visit a report with data/statistics on inspections and repairs of the individual workshop is extracted from the SYS system. The SKL consultants bring as well prints of 5-10 recent inspection reports for discussions with inspectors.

The workshop visit is finalised by a talk with the inspectors and the workshop manager. Both major as well as any minor challenges or irregularities are discussed. If any major irregularities are found these are reported to the Danish EPA to take action.

The report with data/statistics on performed repairs of sprayers made by the workshop is presented during the discussion. Causes of deviations compared to country average are discussed.

## Results

For any of the inspection points the inspector has to report whether e.g. the pump capacity is “OK”, “Repaired” or “Defect”. If any inspection requirements are termed as Defect the sprayer cannot be accepted.

During the first years of inspections, many inspectors reported inspection points as OK even if repairs had been made. The visits, seminars with all workshops, letters to workshops and other contacts between the workshops, the consultants and the Danish EPA have caused the workshops to increase their reporting of the repairs made on sprayers. See table 1.

Table 1. Average number of repairs and percentage of inspected field crops sprayers where repairs were made during inspection.

Year	2014	2015	2016	2017	2018 until July
Inspected sprayer, No	1,583	2,582	3,483	2,635	285
Sprayers with repairs%	47%	72%	81%	92%	91%
Average no of repairs	1.6	3.0	3.8	5.6	5.3

The three types of repairs most often reported are: 1: Filters (blocked or defect), 2: Wear and leakages on pipes and hoses, 3: stability and symmetry of the boom.



Photo 1: Boom stability, as well as nozzle orientation are defects often found on older sprayers.

## Testing equipment

We have now checked all manometers and flowmeters at the workshop at least once.

We have found few errors on test manometer, although some workshop needed to invest in a new test manometer for field crops sprayers (below 6 bar), as the 25 bar manometers used did not meet the 0.1 bar accuracy requirement and 0.1 bar scale requirement.

Some workshop have built their own equipment for testing pump capacity. We have calibrated most of these. We also found flow sensors that needed replacement, as the sensor did not meet the accuracy specifications.

Only few workshops have bought patternators, so most nozzle flow test are made by use of nozzle flow sensors of which most were calibrated during our first visit to the workshop. We are now visiting workshops for the second time, and we do still find flow sensors with deviations that require calibrations.



Photo 2: SKL brings two flow sensors at workshop visits. One is used to test the flowmeter used for pump capacity measurements. The other flow meter (behind the tank) is used to test the hand held nozzle flowmeter.

## Discussion

Both SKL and EPA have focussed on building a good relationship with the inspectors and the workshop managers. It is very important to support the workshops in any challenges that arise during inspections. Communication with workshops is in general open and honest.

When visiting workshops, we first check the flow meters and the test manometers. We hereby ensure the quality of tools used by the inspectors and at the same time, we try to build a positive personal relationship. We require at least one inspector available to help make the equipment ready for checking.

As we have all inspection reports available in SYS, we can prepare our visits by reading through a number of inspection reports and extracting the report on earlier repairs.

If some major deviations on repairs are found compared to the country average, this is discussed during the visit where good explanations are often found. In a few cases, the inspectors are asked to change procedures. It is more often the case, that we instruct inspectors to report the performed repairs correctly.

All workshops are to fulfil the requirements in the guidelines to ensure even quality of inspections on all workshops. It is however not an aim that the number and type of repairs should be the same for all inspectors. The condition and type of the sprayers often differ between workshops. Some workshops

mainly inspect sprayer of a specific brand. This brand may have typical errors whereas other errors are seldom seen. The condition of the sprayer can also differ due to how the workshops instruct the owners to prepare the sprayer for inspections. There are a lot of workshop that are not authorised to inspect sprayer. These workshops often make repairs before they ask an authorised workshop to do the inspection. In this case the repairs are often not registered.

The statistics on repairs are however useful in pointing out where inspections procedures may require changes.