**AW0510: Impact of certification status on other enterprises at the location**

**Introduction**

Previous analysis (see AW0510 report) investigated the association between compliance with animal welfare legislation, as inspected by Animal Health (AH), and the certification status of the enterprise. This additional analysis addresses the question of whether welfare compliance of uncertified enterprises was associated with the certification status of other enterprises at the same location.

**Method**

The data

Data on membership of farm assurance and organic certification schemes were supplied by the scheme providers. See AW0512 report for detail on the AH and certification scheme data.

Data on certification status was most complete for 2008. Therefore in this analysis only inspections that took place in 2008 were included. Visits where only one enterprise was inspected were excluded from the dataset.

Data analysis

Compliance with welfare legislation was investigated in two models, one where the outcome was the AH code for the enterprise (enterprise model) and one where the enterprise data was aggregated to provide an overall AH code for the visit (visit model).

The terms used to define the certification status of an enterprise were as follows;

**assured** = certified by a farm assurance scheme

**organic** = certified by an organic scheme

**certified** = certified by a farm assurance or organic scheme

**not certified / uncertified** = not certified by a participating farm assurance or organic scheme

Assurance status was defined as follows;

Enterprise model: uncertified enterprises on a location where all enterprises were uncertified, uncertified enterprises on a location where other enterprises were assured, assured enterprise on a location where other enterprises were uncertified, assured enterprises on a location where other enterprises were assured.

Visit model: the outcome was the worst AH code across all the enterprises inspected on the location at the visit. The assurance status at the visit was defined as follows; all enterprises were uncertified, some enterprises were assured some were uncertified, all enterprises were assured.

NB. assurance status in both models is defined by the enterprises that were inspected by AH on the visit. Not all enterprises were inspected at every visit and there are no data on enterprises on the location that were not inspected, so this analysis does not fully capture the certification status of the location

Because organic certification schemes are broad and can certify a wide range of enterprise types and did not provide data on which enterprises were certified at each location, it was necessary to

assume that all enterprises on an organic holding were certified organic. Therefore organic certification status was defined as a binary variable certified (1) or uncertified (0) at the farm level.

The outcome in both models was binary;  0 = compliance with welfare legislation (AH code A or B), 1 = non compliance with legislation (code C or D). Random effects were included to account for the clustering of data within counties, locations (CPH / farm address) and enterprises (in the enterprise level model only).

As in previous analyses, models controlled for visit type and country. In the enterprise model enterprise type and the number of animals inspected on the enterprise were also included as fixed effects. In the visit model total number of animals inspected on the location at the visit and number of enterprises inspected were included as fixed effects. In both models number of animals was categorised into a five level variable.

**Results**

Descriptive summaries

Of the 9307 enterprises inspected in 2008, 18% were the only enterprise inspected at a location and so were excluded from the analysis. Of the remaining 7657 enterprises inspected at 2395 visits; 61% were uncertified (based on the data from the schemes that participated in the study, see AW0510 report) and on a location where all inspected enterprises were uncertified, 7% were uncertified on a location where other enterprises were assured, 5% were certified on a location where other enterprises where uncertified and 27% were assured on a location where all inspected enterprises were assured. Overall 3% of inspected enterprises were organic, some of which were also assured.

When enterprise certification status was aggregated by location; 62%, 30% and 8% of locations had all uncertified enterprises, some assured some uncertified enterprises and all assured enterprises respectively. The most frequent combination of enterprises inspected on a visit was sheep and cattle (Table 1).

Table 1. Visits where multiple enterprises were inspected in 2008

| Number of enterprise categories | Enterprise category | | | | Number of locations visited |
|---|---|---|---|---|---|
| | Type 1 | Type 2 | Type 3 | Type 4 | |
| Two enterprises same enterprise group | Cattle | Cattle[1] | | | 727 |
| | Pig | Pig | | | 74 |
| | Poultry | Poultry | | | 31 |
| Two enterprise types | Cattle | Sheep | | | 856 |
| | Cattle | Pig | | | 94 |
| | Cattle | poultry | | | 63 |
| | Sheep | Pig | | | 50 |
| | Sheep | Poultry | | | 23 |
| | Pig | Poultry | | | 22 |
| Three enterprise types | Cattle | Sheep | Pig | | 153 |
| | Cattle | Sheep | Poultry | | 71 |
| | Cattle | Pig | Poultry | | 44 |
| | Sheep | Pig | Poultry | | 37 |
| Four enterprise types | Cattle | Sheep | Pig | Poultry | 150 |

[1]Different types of enterprise were inspected (eg, dairy and beef)

There were fewer AH code C and D (non compliant with welfare legislation) on enterprises that were assured, with other assured enterprises on the location and without, and enterprises that were uncertified but with other assured enterprises on the location, compared with enterprises that were uncertified on locations where all enterprises were uncertified. Overall the lowest number of code C or D in 2008 occurred in the organic enterprises. A similar pattern was evident when the data was aggregated across the enterprises inspected at the visit (Table 2).

Table 2 Number and percent of enterprises and visits coded A-D by certification status

| | | A | | B | | C | | D | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | n | % | Total |
| Enterprise level data | Uncertified , all other enterprises uncertified[1] | 1378 | 29.3 | 1941 | 41.3 | 1185 | 25.2 | 200 | 4.3 | 4704 |
| | Assured, other enterprises uncertified[1] | 284 | 53.6 | 199 | 37.5 | 35 | 6.6 | 12 | 2.3 | 530 |
| | Uncertified , other enterprises assured[1] | 179 | 50.9 | 142 | 40.3 | 23 | 6.5 | 8 | 2.3 | 352 |
| | Assured, all other enterprises assured[1] | 978 | 47.2 | 872 | 42.1 | 172 | 8.3 | 49 | 2.4 | 2071 |
| | Organic, all other enterprises organic[1] | 135 | 5.2 | 72 | 2.8 | 17 | 0.7 | 7 | 0.3 | 231 |
| Visit level data[2] | All enterprises uncertified[1] | 335 | 22.4 | 611 | 40.8 | 429 | 28.7 | 122 | 8.2 | 1497 |
| | Some uncertified some assured enterprises[1] | 284 | 39.8 | 315 | 44.2 | 76 | 10.7 | 38 | 5.3 | 713 |
| | All enterprises assured[1] | 90 | 43.5 | 88 | 42.5 | 22 | 10.6 | 7 | 3.4 | 207 |
| | Organic | 37 | 47.4 | 31 | 39.7 | 5 | 6.4 | 5 | 6.4 | 78 |

[1]on the location at the time of the inspection, [2]Worst AH code across all enterprises inspected on the location at the visit


Final model

Visit model
There was a reduced risk of non compliance with welfare legislation when all the enterprises inspected were organic, assured or when some of the enterprise were assured and some were uncertified, compared with a reference category of visits where all the enterprises inspected were uncertified. There was a significantly increased risk of non compliance on complaint, targeted or risk based visits compared with programmed visits (Table 3).

Enterprise model
There was a reduced risk of non compliance with welfare legislation in enterprises that were organic, assured on a location where all enterprises were assured, assured on a location where other enterprises were not certified and uncertified on a location where other enterprises were assured, compared with a reference category of enterprises that were uncertified and on a location where all enterprises were uncertified.  There was a significantly increased risk of non compliance on complaint, targeted or risk based visits compared with programmed visits. The risk of non compliance increased as the number of animals inspected increased (Table 4).

Table 3. Logistic binomial mixed effects model of the association between certification status and the welfare compliance across all enterprises inspected on visits to locations with more than one enterprise inspected in 2008 adjusted by country, visit type, number of enterprises and number of animals inspected on the visit

| Intercept coefficient | | -2.5 | | |
|---|---|---|---|---|
| | | OR | CI | |
| Certification status of enterprises on the visit | All non certified[1] | Ref | | |
| | Some assured some uncertified[1] | **0.37** | **0.23** | **0.61** |
| | All assured[1] | **0.35** | **0.26** | **0.47** |
| | All organic[1] | **0.40** | **0.18** | **0.90** |
| Country | England | Ref | | |
| | Scotland | 1.32 | 0.88 | 1.97 |
| | Wales | 0.89 | 0.51 | 1.54 |
| Visit type | Programmed | Ref | | |
| | Elective | 0.92 | 0.28 | 2.99 |
| | Complaint | **10.50** | **4.31** | **25.56** |
| | Targeted | **4.73** | **1.97** | **11.36** |
| | Risk based | **2.52** | **1.04** | **6.10** |
| | Random | 1.48 | 0.55 | 3.99 |
| Number of enterprises inspected on the visit | Two | Ref | | |
| | Three | 1.22 | 0.93 | 1.61 |
| | Four | 1.27 | 0.92 | 1.75 |
| | Five or more | 1.05 | 0.69 | 1.59 |
| Total number of animals inspected on the visit | <60 | Ref | | |
| | 60-120 | 1.22 | 0.87 | 1.72 |
| | 121 -220 | 1.13 | 0.79 | 1.61 |
| | 221-450 | 1.16 | 0.80 | 1.68 |
| | >450 | 1.38 | 0.96 | 1.99 |
| Random effects | County | 0.20 | 0.08 | |
| | Locations | 0.77 | 0.17 | |

[1] on the location at the time of the inspection

Bold = significantly different from the reference category, p<0.05

Table 4. Logistic binomial mixed effects model of the association between certification status and the welfare compliance of the enterprise on visits to locations with more than one enterprise inspected in 2008 adjusted by enterprise type, country, visit type and number of animals inspected on the enterprise

| Intercept coefficient | | -2.87 | | |
|---|---|---|---|---|
| | | **OR** | **CI** | |
| Certification status of the enterprise | Uncertified , all other enterprises uncertified[1] | Ref | | |
| | Assured, other enterprises uncertified[1] | **0.25** | **0.15** | **0.42** |
| | Uncertified , other enterprises assured[1] | **0.33** | **0.19** | **0.58** |
| | Assured,  all other enterprises assured[1] | **0.27** | **0.20** | **0.36** |
| | Organic, all other enterprises organic[1] | **0.38** | **0.17** | **0.85** |
| Enterprise type | Cattle | Ref | | |
| | Sheep | 0.94 | 0.77 | 1.15 |
| | Pigs | 1.25 | 0.97 | 1.60 |
| | Poultry | 0.80 | 0.60 | 1.07 |
| Country | England | Ref | | |
| | Scotland | 1.29 | 0.84 | 1.99 |
| | Wales | 0.81 | 0.46 | 1.46 |
| Visit type | Programmed | Ref | | |
| | Elective | 1.12 | 0.43 | 2.95 |
| | Complaint | **11.01** | **5.30** | **22.88** |
| | Targeted | **4.80** | **2.35** | **9.81** |
| | Risk based | **3.03** | **1.47** | **6.24** |
| | Random | 1.98 | 0.88 | 4.49 |
| Number of animals inspected on the enterprise | <8 | Ref | | |
| | 8-19 | 1.17 | 0.92 | 1.48 |
| | 20-46 | **1.29** | **1.02** | **1.64** |
| | 47-112 | **1.40** | **1.09** | **1.80** |
| | >112 | **1.58** | **1.20** | **2.09** |
| Random effects | County | 0.23 | 0.10 | |
| | Locations | 1.80 | 0.27 | |
| | Enterprises | 2.85 | 0.26 | |

[1] on the same location at the time of the inspection
Bold = significantly different from the reference category, p<0.05

**Conclusion**

The analysis indicates that the risk of non compliance in uncertified enterprises on locations where other enterprises are assured, is similar to that of assured enterprises whilst where all enterprises are uncertified the risk of non-compliance is higher. These results must be interpreted with the knowledge that there is some error in the certification status of enterprises because not all schemes participated in the study and only enterprises  inspected by AH could be included in the analysis.