

Reducing the incidence and levels of Nicarbazin residues in British chicken

A joint Government and industry initiative

Reducing the incidence and levels of Nicarbazin residues in British chicken

A joint Government and
industry initiative



Contents

	Page
Executive Summary	1
Introduction and objectives	3
Partners in the initiative	4
Background	5
Methodology	8
Results	9
Questionnaire findings	9
Animal Health Inspectorate/AMI inspections of high positives	12
Conclusions	13
Recommendations	15
Annex 1	16
Annex 2	17
Annex 3	19
Annex 4	26

Executive Summary

1. The FSA has facilitated a joint initiative involving the British Poultry Council, the National Farmers Union and the Veterinary Medicines Directorate to identify ways in which the poultry industry can reduce the incidence and levels of nicarbazine residues in British chicken and to raise awareness of the issue amongst farmers. Other organisations involved in this initiative were Animal Health, Animal Medicines Inspectorate, Meat Hygiene Service, Agri-Food and Bioscience Institute of Northern Ireland, Agricultural Industries Confederation (AIC) and Elanco Animal Health. Nicarbazine is a specified feed additive used for the treatment of coccidiosis, a potentially fatal and debilitating disease of chickens. It is commercially available as a feed additive called *Maxiban*.
2. The initiative covered poultry farmers in Great Britain whose chickens were sampled under the National Surveillance Scheme (NSS) for veterinary residues carried out by the Veterinary Medicines Directorate. As part of the NSS, samples of chicken (livers and muscle) are taken at poultry slaughterhouses and tested for a range of veterinary residues.
3. Since 1998, the incidence of nicarbazine in chicken detected by NSS sampling has fallen from a level of 25.5% to 8.5% in 2006. In the majority of cases the residues are found only in liver samples. Although this reduction was welcome and current residue levels are not a significant food safety risk to consumers, the FSA believed that further work was needed to tackle the incidence and levels of such residues, which may be due, at least in part, to poor feed management practices on-farm. The FSA recognised that consumers expect all veterinary medicine residue levels to be kept to a minimum. Industry also accepted that consumers require assurances that the poultry they eat contain the lowest possible residues of feed additives.
4. For 12 months from February 2007 to January 2008 farms sampled under the NSS were sent a questionnaire seeking information about their feed management practices. The study focused in particular on what was happening when the crop of birds sampled were being raised. A similar initiative was undertaken in Northern Ireland in autumn 2007.
5. The results of the study give a detailed picture of the sampled farms' feed storage and distribution management systems. The work supports the findings of previous studies on potential causes of nicarbazine residues in poultry and highlights possible factors that may lead to residues still being found in British chicken.

Recommendations are made for how industry should tackle the issue. Key recommendations include: maintaining current best practice advice as it appears to be effective; training on the use of nicarbazine on-farm is maintained and regularly updated; ensuring farmers are aware of the precise amounts of nicarbazine feed required; and ensuring that both single and double bins are emptied of any remaining nicarbazine feed before the 5 days withdrawal period prior to processing.

6. It is hoped that the recommendations from this project will be taken into account in best practice for nicarbazine use and general feed management on-farm and shared across the whole UK poultry industry, and lead to a further fall in the incidence and level of nicarbazine residues found in British chicken.

Introduction and objectives

1. This joint initiative was facilitated by the Food Standards Agency and involved the British Poultry Council, the National Farmers Union and the Veterinary Medicines Directorate (VMD), amongst others. Nicarbazine is a feed additive used for the treatment of coccidiosis, a potentially fatal and debilitating disease of chickens. It is available commercially as the feed additive *Maxiban*. Although the incidence of residues has been falling and the industry has been working hard to reduce these residues, it was agreed there was room for further improvement.
2. The aim of the work was to identify why residues are still being found in chicken and how they could be avoided. This would inform best practice advice about on-farm feed management practices that could be publicised to growers to help them avoid or at least reduce nicarbazine residues in their chickens.
3. The initiative covered poultry farmers in Great Britain whose chickens were sampled for veterinary residues under the National Surveillance Scheme (NSS) for 2007, operated by the Veterinary Medicines Directorate. The results presented relate specifically to this study and though broadly in line with the NSS they are not directly comparable. Full results from the NSS sampling are published by the VMD MAVIS site¹. A similar initiative was undertaken in Northern Ireland in autumn 2007.

¹ <http://www.vmd.gov.uk/Publications/MAVIS/mavis.htm>

Partners in the initiative

4. Both industry and government were involved in this study. The Food Standards Agency acted as a facilitator and jointly-funded the initiative with an independent project co-ordinator. The study was carried out in association with the British Poultry Council and National Farmers Union. Other member organisations of the project group were:
 - Veterinary Medicines Directorate;
 - Meat Hygiene Service;
 - Animal Health (formerly the State Veterinary Service);
 - Animal Medicines Inspectorate;
 - Agri-Food and Bioscience Institute of Northern Ireland;
 - Agricultural Industries Confederation; and
 - Elanco Animal Health.

Background

5. Nicarbazine is a coccidiostat (a type of feed additive) that is used to prevent coccidiosis (a protozoal disease of poultry). Coccidiosis has serious economic consequences for farmers. Nicarbazine is used widely to control this debilitating disease and is currently only available in the form of the feed additive *Maxiban*.
6. *Maxiban* is a coccidiostat feed additive containing equal amounts of nicarbazine and narasin. It is provided in feed to broiler chickens from placement and is typically fed up to around 28 days of age when it is stopped to permit the thinning of birds prior to slaughter. Five days is the minimum withdrawal period for this medicated feed. The critical period of treatment with nicarbazine to counter coccidiosis is 16 to 24 days of age.
7. Each year the VMD take samples from poultry slaughterhouses to test for nicarbazine as part of their National Surveillance Scheme for veterinary residues. Details of the scheme are given in Annex I. Table 1 shows results from the NSS for nicarbazine in chicken liver from 1998 to 2007.

Table 1 – UK sampling results for nicarbazine in chicken liver

Year	Positives (%)	Range (µg/kg)
1998	25.5	200 – 7,200
1999	26.0	200 – 10,500
2000	15.6	200 – 2,800
2001	17.4	240 – 3,250
2002	8.0	200 – 2,610
2003	13.9	201 – 3,700
2004	12.6	200 – 3,400
2005	8.8	210 – 3,030
2006 ²	8.5	210 – 3,100

8. The FSA routinely evaluates the results of the VMD's surveillance of veterinary medicine residues, including nicarbazine, in foodstuffs and considers that levels of nicarbazine currently found are not a significant food safety risk. However, consumers expect these and other residue levels to be kept to a minimum. Industry also recognises that today's consumers require assurances that the poultry meat they eat contains the lowest possible concentrations of residues of feed additives.

² 2007 results are not referred to in the report because the project overlapped the 2007 sampling period and may have had an influence on the percentage of positives.

9. Since 1998, the incidence of nicarbazine residues in chicken detected by NSS sampling has fallen from a level of 25.5% to 8.5% in 2006. In the majority of cases the residues are found only in the liver samples, although muscle is also tested under the NSS. Although not a risk to consumers, the current levels still represent a significant incidence and it was important to determine if more specific advice could be given on changes in farm management practices that would lead to a further reduction in these levels of contamination.
10. One significant factor in the reduction of residues as detected by the NSS is a training programme organised by Elanco Animal Health (the manufacturers of *Maxiban*). The training focuses on farmers and farm managers and gives advice on how to manage bulk feed bins on poultry farms. Uptake of this training has been widespread across the UK.

Previous studies on nicarbazine

11. Industry and regulators have looked closely at the problem of nicarbazine residues in poultry livers since the late 1990s and various studies have been published on the subject. A list of key references can be found at the end of the report. Links to best practice for reducing nicarbazine residues is summarised in Annex 2. No easy solution has been forthcoming, although it was apparent that the causes were linked to feed management on-farm. Suggested causes for nicarbazine residues have included:
 - Contamination during manufacture of the feed;
 - Contamination of feed during transport;
 - Discharge or delivery of feed to the wrong bin;
 - Consumption of spilled feed;
 - Recycling of residues as a result of consumption of faeces;
 - Inadequate changeover to withdrawal feed;
 - Slaughter of birds during the feed withdrawal period; and
 - Ineffective cleaning of bulk bins, lines or feed hoppers between batches of feed on farm.
12. More recently, the independent Veterinary Residues Committee (VRC) set up a Feed Additives Sub-Group to consider various strategies to help reduce the incidence of nicarbazine residues on-farm.
13. The FSA subsequently held meetings with stakeholders and as a result it was agreed that a joint industry-regulator initiative was the preferred way forward. This led to this study.

Enforcement action and nicarbazine residues

14. There is currently no established EU Maximum Residue Limit (MRL) for residues of nicarbazine in poultry meat and liver. EU MRLs are currently being established for those coccidiostats that are licensed for use in the Community. At a global level, the WHO/FAO Joint Expert Committee on Food Additives (JECFA) has established an MRL for nicarbazine of 200 µg/kg in liver. In the absence of an established EU MRL, this limit has been adopted by the UK as an unofficial regulatory limit.
15. NSS samples with nicarbazine levels over 200 µg/kg are reported as positive by the Veterinary Medicines Directorate. Samples with nicarbazine levels over 1000 µg/kg are currently followed-up on-farm by the Animal Medicines Inspectorate and/or Animal Health. The Animal Medicines Inspectorate (AMI) may visit the feed mill if necessary.
16. Such visits could be several months after the sampled birds were slaughtered and thus some time after the birds left the farm of origin. It was therefore difficult to get a true and accurate picture of feed management practices on the farm at the time the birds were being raised. Another aim of this initiative was to overcome this problem by seeking information from farms far sooner after the birds left the farm of origin.

Methodology

17. As part of the surveillance scheme, samples of chicken livers and muscle were taken at slaughterhouses by the MHS. The liver samples were tested for nicarbazine and the results have been evaluated in this survey.
18. From 1st February 2007 to 31st January 2008 those GB farmers sampled under the NSS³ for nicarbazine residues were sent a questionnaire to complete (attached as Annex 3). It sought information about feed management practices on-farm when the sampled bird was being raised (i.e. the last crop raised) with the intention of determining how these practices related to residues of nicarbazine in the sampled birds. The questionnaires were drawn up with Animal Health (who used inspection forms when visiting farms where residues exceed 1000 µg/kg), the project group and FSA statisticians. The form was kept to a maximum of 6 sides as it was felt that too long a form might discourage farmers from completing them.
19. An independent project co-ordinator was employed specifically to work on this initiative to liaise with farmers and act as an information point about the initiative. The co-ordinator's more specific roles were:
 - to receive notification from the processing plant when a sample was taken and contact details of the sampled farm;
 - phone the sampled farm to explain the initiative and send out the questionnaire immediately after the birds were slaughtered;
 - receive the completed questionnaires from farmers and collate the data; and
 - present the data to the project group omitting identification details of farms and farmers (the data provided in the forms was treated as confidential so any farm identification information was excluded thus maintaining privacy for the farm).
20. This allowed the study to obtain information from a high proportion of sampled farms and to capture information about the conditions immediately after the birds were sampled and before the results of the sampling were known.
21. FSA statisticians carried out statistical analysis of the data although it was acknowledged at the start of the study that linking this work to the NSS sampling strategy would mean that a full quantitative statistical analysis of the data would not be valid. However, it was recognised that qualitative interpretation of the data could provide an indication of what practices were associated with the presence of nicarbazine residues in food.

³ No samples were taken in December 2007 as VMD's annual NSS for nicarbazine runs from 1 January to 30 November. Sampling resumed 1 January 2008.

Results

22. 320 questionnaires were sent to farms and 268 were returned (a high response rate of 86%). Sixteen farms (6%) did not use nicarbazine which left a final sample size of 252.
23. Results presented in this analysis have taken into consideration the possible bias caused by the nature of the questions (i.e. whether they were considered to be 'leading' questions). Statistical analysis has only been conducted where this is valid and as a guide to highlight significant results.
24. Detectable levels of nicarbazine fall into three categories: levels less than 200µg/kg are not considered to be "positives" as they are below the JECFA MRL action level; low level positives between 200 and 1,000µg/kg which are notified to the farmers concerned by the VMD; and high level positives above 1,000µg/kg which are investigated with a farm visit.
25. Positives in this study refer to 18 samples where the residues were in excess of the 200µg/kg reference level (JECFA MRL) for nicarbazine and samples reported above the Limit of Detection (LOD)⁴. This maximised the number of samples for the analysis and optimised the chance of determining any trends in the data. As a result of this the positive sample size increased from 18 to 41 with levels ranging from 60 µg/kg - 3000µg/kg (only 2 samples were below 100µg/kg).
26. It should be noted that use of these lower residue levels does not affect the VMD reporting level of 200µg/kg

Questionnaire findings

27. A more detailed analysis of the results can be found at Annex 4. A description of the key findings of interest is provided below and should be read in conjunction with the relevant question in Annex 4. This provides a qualitative indication of which farming practices could or could not be contributing to the incidence of nicarbazine residues.

Farm type

- There was no association between positives and type of farm sampled - whether the farm is independent or fully integrated (Q1a) or whether the farm is housed, free range or organic (Q1b).

⁴ For screening the action level used in liver is 100 µg/kg. Any sample screened above this level will then be confirmed. The limit of detection of this test is 10 µg/kg. For confirmation in liver the lowest calibrated level used is 100 µg/kg. The limit of detection for this test is also 10 µg/kg. On some occasions results below the lowest calibrated level have been reported.

Feed transfer

- There was a slight increase in positives (statistically non-significant) where feed was being transferred from other farms and the number of farms reported positive (Q9). Feed transfer has previously thought to contribute to nicarbazine residues. However, considering the small positive sample size, sampling and questionnaire bias, it is not possible to draw any significant conclusions.

Thinning

- There was no increase in the incidence of residues from birds which had been thinned compared with those removed at final de-population (Q6), which confirms that in this study 'thinned' birds are as likely as 'final de-population' birds to have had the 5 day withdrawal. This was previously considered one of the possible key causes of residues and could now be indicative of the success of existing training and best practice advice.

Eating from pans

- There was a slight increase (statistically non-significant) in the number of farms who reported positive for residues and who operated the practice of eating out the pans rather than lifting the pans (Q16). This could be the result of chickens eating out any remaining smaller grain starter rations containing nicarbazine. However, considering the small positive sample size, sampling and questionnaire bias, again it is not possible to draw any significant conclusions.

Catching programme

- Change of catching programme does not seem to affect the presence of residues (Q19). 90% of positives reported no change to the programme.

Spillage

- In this study feed spillages appear not to have an effect on nicarbazine residues (Q21). However, cleaning up spillages is still considered best practice on-farm.

Scratching out

- There appears to be a statistically significant association with 'scratching out' and testing negative for nicarbazine (Q22). Scratching out is when chickens flick or scratch feed out of the pans or tracks onto the floor instead of eating it and usually occurs early in life (10 - 21 days). A possible reason for this trend might be young birds scratching out the nicarbazine feed leading to less nicarbazine feed being present in the pans at the final stage before processing when the pans are eaten out.

Feed bin age

- A statistically significant difference ($p < 0.05$) between positive and negative samples was seen associated with the age of bulk bins⁵ (Q24) with bins over 15 years more likely to be associated with positives. This may be indicative of older bins being more problematic in terms of feed supply, leading to positives. This links to another potential contributing factor observed in the study in that bin systems less than 15 years old are significantly less likely to have bridging and/or hanging reported than those 15 years and older ($p < 0.001$).

Single vs double bins

- There appears to be no association between the type of bin system (single, double or triple) and the occurrence of positives (Q27). This indicates that this is not a problem that is exclusive to single or double bin systems but rather a problem found across all types of bins used.

Emptying bins

- There was an increase (statistically non-significant) in the positive group for farms not completely emptying single bins between delivery of nicarbazine feed and 5 days before processing (Q29). If the bins are not emptied of nicarbazine feed, according to the 'first in last out' principle, it may be fed to birds after the withdrawal rations and just before processing.

Feed retention

- Contrary to expectations there was an increase (statistically non-significant) in farms that tested negative who claimed to have placed Finisher feed on top of nicarbazine feed for double bins (Q31a). Similarly while no farms who reported positive claimed to have placed withdrawal feed on top of another feed, 5% of the farms that tested negative claimed to have placed withdrawal feed on top of another feed (31b).

Current best practice is that all farms using nicarbazine should ensure that bins are completely emptied between last nicarbazine delivery and 5 days prior to processing. In addition, withdrawal feed should not be placed on top of another feed.

Staff training

- There was a slight increase (statistically non-significant) in the number of farms who reported negative for residues where staff training had taken place. However, considering the small positive sample size, sampling and questionnaire bias, it is not possible to draw any significant conclusions.

⁵ Bulk bins vary in shape, size and construction. How well the feed flows out of the bin can vary depending on bin structure and consistency of feed (for example there will be less flow if it is damp or wet). In some cases it will not flow as well and bridges or "hang ups" occur in the bin. If it does this it can fall down and flow out of the bin at a later stage.

Animal Health Inspectorate/AMI inspections of high positives

28. During the project there were six liver samples recorded with high residues above 1000µg/kg (1200; 1300; 1400; 1400; 1800; and 3000µg/kg). In each case the Animal Medicines Inspectorate and/or Animal Health visited the farm in line with current practice. Four showed no clear reason for the positive other than being possibly due to poor bulk bin management. For one case the identified cause was over-ordering the starter crumb diet, which then led to later problems. In a second instance, finisher feed was delivered to the wrong bin without the farm manager's knowledge.
29. This illustrates the importance of having a policy on-farm in terms of fully communicating any problems found to managers, as correct farm management practices are key to reducing residues.

Conclusions

30. The study identified several possible factors (albeit mostly statistically non-significant) as likely causes of detectable nicarbazine residues in chicken liver.
31. These factors all relate to management of feed storage and distribution systems on-farm. For example: feed pans being eaten out rather than lifted; the age of feed storage bins; bin-emptying and different house feeding systems. All of these have been shown previously to be linked to residues of nicarbazine but we suggest that these are more likely to result in the low level residues (i.e between 200 and 1,000µg/kg – see paragraph 27).
32. Residues greater than 1,000µg/kg would most likely need the birds to have been exposed to feed containing nicarbazine over several days. This suggests a breakdown in the farm's control mechanisms for bulk bin management so that nicarbazine feed is presented to the birds for a time during the 5 day pre-slaughter withdrawal period. Examples of likely causes on farm include: feed being placed in the wrong bins; damp feed causing hang-ups in bins; and starter pelleted feeds being placed on top of starter crumbs containing nicarbazine.
33. The study highlighted that although it is best practice advice to empty bulk bins between feed deliveries, this does not always happen in practice, probably because farms are reluctant to risk shortage of food supplied to birds. This appears to be a possible factor relating to detectable residues.
34. Responses to the question relating to the amount of nicarbazine feed on-farm suggests that some farm managers may not be aware of precisely how much feed containing nicarbazine is needed on-farm. The ratio of tonnes of nicarbazine feed on farm per 1000 birds can be calculated accurately. Over-ordering could lead to bin management problems such as feed being placed on top of feed which could potentially lead to increased residues in birds.
35. One of the main outcomes of the study is that this joint initiative provides a good example of industry and regulators working successfully together to overcome a problem which was first identified in the late 1990s and for which no easy solution was available. The joint working made it possible to overcome barriers which had previously prevented the issue from being investigated.

36. Industry has fully supported this initiative, which is shown in the 86% return rate of questionnaires. This is in excess of the vast majority of other surveys. The initiative may have already had an impact as the 2007 data shows that nicarbazin residues were reported as 5.8% of the UK samples tested, a reduction from 8.5% in 2006 and the lowest reported since 1998.
37. The study identified that training and existing best practice advice is currently working and has probably been largely responsible in reducing residues since the late 1990s.

Recommendations

38. It is hoped that the following recommendations from the initiative will be adopted across the industry.
- That the current best practice advice be maintained because it is still appropriate and has been successful in reducing nicarbazine residues;
 - That all levels of farm staff be trained and that training be refreshed on a regular basis.
 - That managers remove any existing blame culture to encourage mistakes to be identified and rectified quickly.
 - That farm managers are aware of the precise amount of nicarbazine feed needed for the birds on the farm and which feeds contain nicarbazine.
 - That farms devise a system (whether for a single or double bin) to make sure any bin that has received feed containing nicarbazine is completely emptied in the period between the last delivery of nicarbazine containing feed and five days before the first birds go for slaughter.
 - That the feed in the feeders be tested regularly using the on-farm feed test (soon to be available) to confirm the robustness of the systems that farmers use to protect against nicarbazine residues in the poultry they produce.

Annex 1

All EU Member States are required to carry out surveillance for residues of veterinary medicines and certain other substances in accordance with Council Directive 96/23/EC. This sets out the degree of sampling required in accordance with national throughput (in the case of poultry the minimum number of samples to be taken each year must equal at least one sample per 200 tonnes of annual deadweight) production.

The Directive requires Member States to provide an annual plan, running throughout the calendar year. Samples are spread equally throughout the year (except in areas where animals are known to be treated at a particular time of year when it makes sense to target that sector at that time).

The Directive prescribes the percentage of samples that must be tested for particular groups of substances, such as antibacterials and anticoccidials. The UK complies with these requirements. There is discretion for Member States to use some of the sample allocation as they see fit, which the UK has occasionally used to increase sample numbers of nicarbazine in broiler livers. On average, samples between 250 and 300 samples are taken each year for nicarbazine analysis. Although this number has increased for 2008 to approximately 500 samples since the start of 2008, one sample is tested for a number of substances under the NSS rather than one sample taken for nicarbazine testing only.

Unlike most other Member States, the UK has deliberately chosen to sample broiler livers for nicarbazine, as this is the best tissue to use to establish its presence (Nicarbazine remains in poultry liver several days longer than it does in muscle). The independent Veterinary Residues Committee (VRC) has more recently recommended that where a sample of liver contains a residue of nicarbazine above the JECFA level of 200µg/kg (parts per billion) then muscle from the same birds should also be tested for comparison purposes.

The VRC's website: www.vet-residues-committee.gov.uk contains several useful papers explaining the work done on behalf of the VRC in establishing the causes of concentrations of nicarbazine in broilers. (Paper VRC/05/09 summarises the activities in nicarbazine in poultry and collates the outcome of investigations ordered by the Veterinary Medicines Directorate into positive cases over 2003 and 2004, which have helped to firm up the causes of concentrations above the JECFA MRL).

Annex 2

Current best practice

The following is a list of the best practice guidance on nicarbazine use:

- Ensure feed bins are completely emptied of nicarbazine containing feed before filling with non-nicarbazine containing feed.
- Clear up any feed spillages containing nicarbazine – **do not cover with litter.**
- Clearly label any bags containing nicarbazine feed to prevent accidental use.
- Keep feed containing nicarbazine separate from feed not containing nicarbazine and clearly identified. If feed is removed from a bin, then full traceability must be maintained.
- When feed deliveries are made – be present, make sure the correct feed goes to the correct bin, make sure bins are labelled correctly.
- Ensure that deliveries of feed to farm are according to the Agricultural Industries Association's Code of Practice for the Manufacture of Safe Compound Animal Feedingstuffs,
- Ensure the withdrawal of 5 days is adhered to before birds are allowed to be processed (i.e. before catching for slaughter), do this by removing feed containing nicarbazine for the appropriate number of days before slaughter.
- Completely empty each bin after each house is cleared of birds. Knock the bin sides to dislodge any feed hung up in the bin. Visually inspect the inside to be sure no feed remains.
- Inspect bins regularly – how much feed is present (how much feed is needed) and determine how clean the bins are.
- It is the responsibility of the farm manager to record all deliveries of feed and movement of feed between houses, and maintain full traceability.
- Farm managers must be fully aware of the appropriate Withdrawal Period for each of their feed deliveries and must ensure that the last possible exposure to diets containing nicarbazine is observed.
- Maintain full traceability – keep good records of all deliveries. movement of feed, withdrawal etc.
- For double bins turn off the auger or close the slide prior to a new feed delivery.
- It is important that no other feed is put into the bin that contained starter crumbs until that bin is completely emptied and any remaining starter crumbs are completely consumed from the bin, and feed hoppers.

- Withdrawal feed must always be discharged into an empty bin. It is the farmer's responsibility to ensure this bin is empty and to inform the feed mill if it will not be empty on a planned delivery date.
- For single bins, bin stocks are to be established five days prior to the withdrawal period starting. If additional feed is required to reach the desired withdrawal date it must be added in small accurate quantities and bin stocks must be monitored on a daily basis thereafter to ensure all the finisher ration has been consumed.
- The movement of feed out of a bin occurs directly above the discharge opening. The remaining feed then cascades down the slope of the crater that is formed. Failure to completely empty bins before refilling may result in residual feed, which may contain nicarbazin, being left in the bin.
- If possible there should be two feed bins. However, to prevent cross-contamination in units without two bins, clean out holding bins and delivery wagons before putting feed not containing nicarbazin into them.
- Where two feed bins are used it is still important to remove all feed containing nicarbazin from a bin before feed not containing nicarbazin is added to the bin.
- Farm managers should be trained on all aspects of the use of feed containing nicarbazin with an emphasis on the correct procedures for withdrawals prior to slaughter. Other relevant staff should have appropriate training to ensure they can assist the farm manager in their responsibilities.
- Do not remove birds for early slaughter when they are consuming feed containing nicarbazin. No birds must be allowed to go to slaughter until all withdrawal requirements have been met.
- We recommend that a 250g sample of withdrawal diet should be obtained from the feeding system and kept in a rodent proof box for at least two crops.

Annex 3

NICARBAZIN (*MAXIBAN*) INFORMATION FORM

This section for Official Use Only

Sample Taken

RIM Number (Official Reference Number)	<input type="text"/>
Date sample taken	<input type="text"/>
Name or number of the abattoir or processing plant	<input type="text"/>
House number of sampled bird (or house numbers if mixed load)	<input type="text"/>
Form Number	<input type="text"/>

- Please fill in this form **only** if you have been notified that the National Surveillance Scheme sample to test for Nicarbazine (*Maxiban*) residues has been taken by the Meat Hygiene Service from birds produced by your farm.
- All the questions relate to the batch of birds sent for processing from which a sample has been taken.
- The RIM number cannot be used to identify your farm by organisations other than those directly involved in the national surveillance. The results of the questionnaire will be confidential.
- Please give an honest answer! It is important to help the industry understand why Nicarbazine (*Maxiban*) is found in poultry.
- Two forms need to be completed if the sample was from a mixed load of 2 houses.
- You may wish to keep a copy of the form for your own records.
- If you have any problems filling in the form please contact the Project Co-Ordinator [contact details removed for the report].
- *Maxiban* is the only authorised feed additive containing Nicarbazine.

For each question, please tick the box that best describes your farm and practices, or write in the date or number requested.

Type of farm

1. Is your farm
- Part of an integrated company
 - Independent
 - Independent packing to an Integrator

Size of farm

2. Number of birds placed on the whole farm.

House Details

3. House number
4. Number of birds placed
5. Date when birds placed
6. Was the sample taken as:
- Part of thinning
 - Final depopulation

Feed Supply

7. Name of feed supplier
8. Location and postcode of feed mill
9. Was any feed transferred to this farm from another farm during this crop?
- Yes
- No
10. Do you use Nicarbazine (*Maxiban*)?
- Yes
- No

If NO, go to Q.15

11. Did this house receive any feed deliveries as either a mixed feed delivery or split load where one part of the load contained Nicarbazine (*Maxiban*) and the other part of the load did not contain Nicarbazine (*Maxiban*) e.g. finisher or withdrawal?
- Yes
- No
- Don't know
12. Up to what age, in days, did you feed Nicarbazine (*Maxiban*)?
13. What was quantity of *Maxiban* feed delivered for the whole farm in tonnes?
14. When the withdrawal diet was started, how old were the birds in days?

Feeding System

15. Which system is used for first week feed?
- Flooded pans
- Paper strips
- Whole house
16. How was feed removed before the birds were sent for processing?
- Tracks/Pans lifted
- Tracks/Pans 'eaten out'
17. How long were the birds not presented with feed on farm before catching?
- Number of hours
18. What was the approximate journey time to the processing plant,
- in hours?

19. Were there any changes in the programme and catching plan that altered the date sent for processing?
- No
- Yes – processed earlier
- by how many days?
- Yes – processed later
- by how many days?

Spillages

20. Does your feed distribution system produce spillages of feed?
- Occasionally
- Often
- Never

21. Had any feed spilled in the litter during this crop?
- Yes
- No

If yes, did the spilled feed contain Nicarbazin (*Maxiban*)?

- Yes
- No
- Don't know

22. Had the birds been scratching out the feed from the feeders?
- Yes
- No

Bin Management

23. Was there any bridging and/or hanging up in the bin?
- Yes
- No

24. How old is the bin system on your farm?

Less than 5 years

5-10 years

10-15 years

More than 15 years

25. What is the bin of the sampled house made of ?

Metal

Fibreglass

Wood

26. For that bin, what discharge mechanism is used for the feed system?

Auger

Gravity feed

27. What type of bins supply compound feed to the sampled house?

Single

Double

For Single Bin System ONLY. For Double Bins go to Q.30

28. Did the feed bin run empty at any time during the withdrawal period just prior to slaughter?

Yes

No

29. Was the feed bin completely emptied between delivery of Nicarbazine (*Maxiban*) and 5 days before slaughter?

Yes

If yes, give date emptied

No

Don't use Nicarbazine (*Maxiban*)

For Double Bin Systems ONLY. For Single Bins, go to Q.28

30. Was any feed left in the bin from the last crop?

Yes

No

If yes, how much would you estimate was left (in tonnes)?

And when was this fed to the birds in the sampled house (age in days)?

31. During this crop:

a. was Finisher diet placed in a bin on top of feed containing Nicarbazine (*Maxiban*)?

Yes

No

b. was Withdrawal diet placed in a bin on top of another feed?

Yes

No

Training

32. Have you or any of your staff at this site attended the Elanco training on the use of Nicarbazine (*Maxiban*)?

Yes

No

33. Which assurance schemes does your farm belong to?

None

ACP

Other (please state below)

Thank you for completing this form.

Please now send it by post to:

[the project co-ordinator – details removed for the report]

Annex 4

Analysis of the Questionnaire Findings

From 320 questionnaires, 268 were returned (a response rate of 86%). 16 of the farms did not use nicarbazine, leaving a final sample size of 252.

Results presented in this analysis need to take into consideration the possible bias caused by the way questions have been phrased. Any erroneous answers have been excluded from the analysis.

Therefore, these results should be treated as qualitative. Qualitative results may be used to highlight interesting observations but to have statistically robust findings further study will be needed.

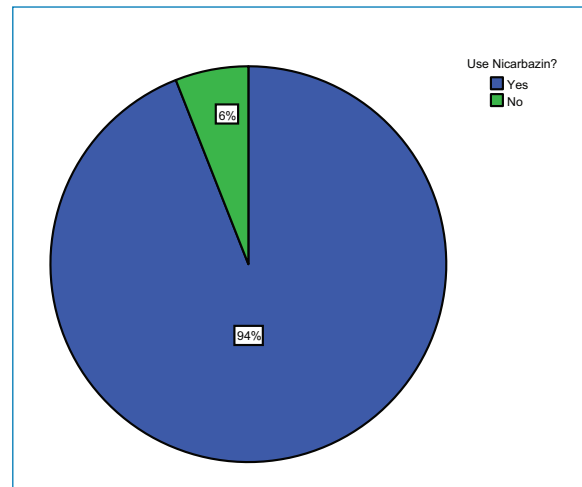
This report lists the questions and their results that maybe used to address the goal of minimising nicarbazine in chickens after slaughter. It also splits the results by positive and negative final confirmed results (for nicarbazine residues).

Farms defined as non-users of nicarbazine were excluded from the reporting other than on page 2 – Q10.

This analysis has been conducted using SPSS v14. Pearson's Chi-squared test has been used for the discrete data and t-tests for continuous data when comparing the positive and negative groups. These p-values have only been included where significant.

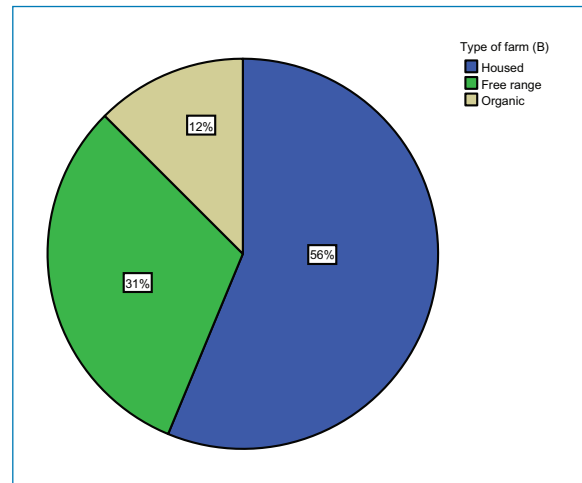
Question 10:
Do you use Nicarbazin?

Overall	
Yes	94% (252)
No	6% (16)
Total	100% (268)



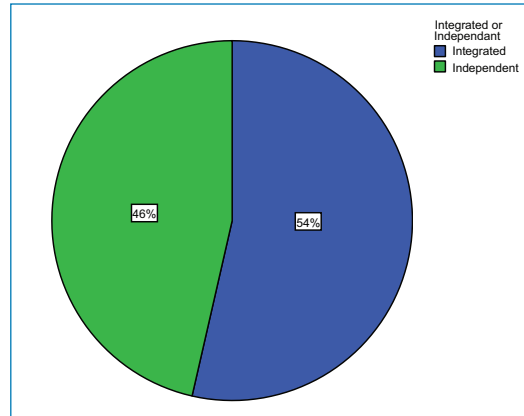
Farm type for those NOT using Nicarbazin

Negative	
Housed	56% (9)
Free Range	31% (5)
Organic	13% (2)
Total	100% (16)

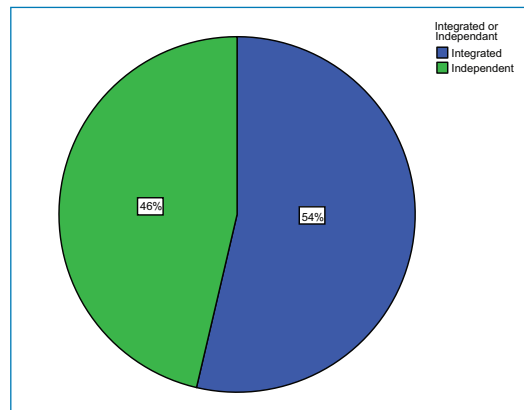


Question 1a: Is your farm?

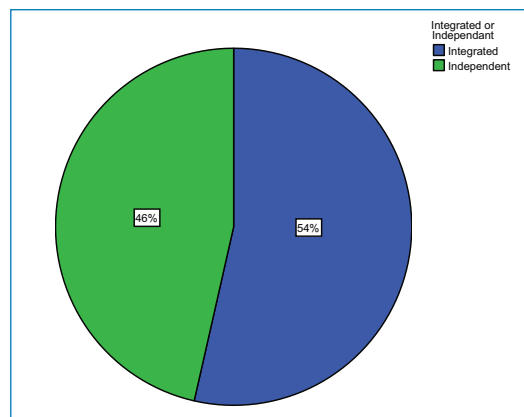
Overall	
Part of an Integrated company	54% (135)
Independent	46% (117)
Total	100% (252)



Positive	
Part of an Integrated company	54% (22)
Independent	46% (19)
Total	100% (41)



Negative	
Part of an Integrated company	54% (113)
Independent	46% (98)
Total	100% (211)



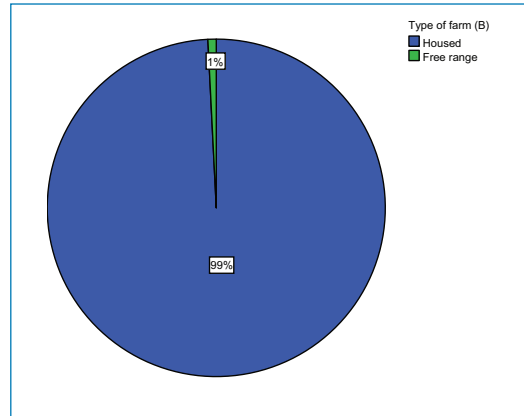
This question originally had three possible answers

- Part of an integrated company
- Independent
- Independent packing to an integrator

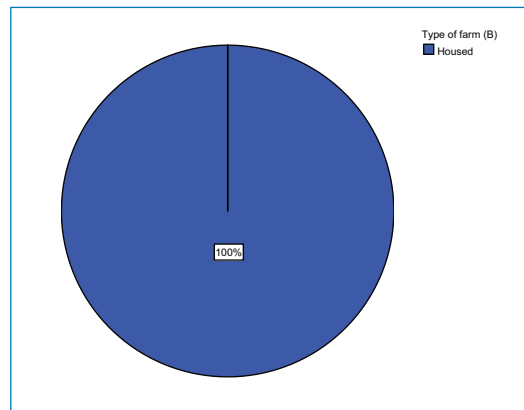
It was felt that the distinction between 'independent' and 'independent packing to an integrator' was not understood by all the respondents and many put their farms into the wrong category. For this reason the groups were combined.

Question 1b: Is your farm?

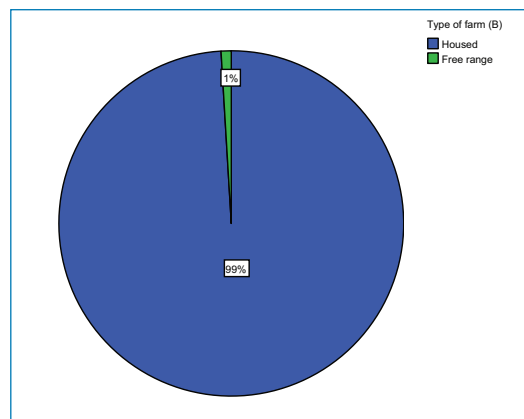
Overall	
Housed	99% (250)
Free Range	1% (2)
Organic	0% (0)
Total	100% (252)



Positive	
Housed	100% (41)
Free Range	0% (0)
Organic	0% (0)
Total	100% (41)



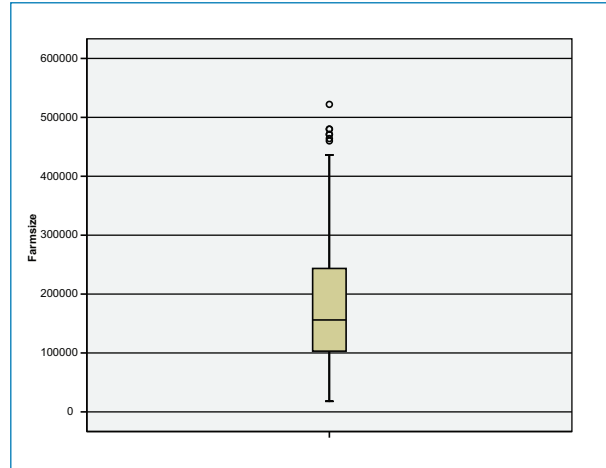
Negative	
Housed	99% (209)
Free Range	1% (2)
Organic	0% (0)
Total	100% (211)



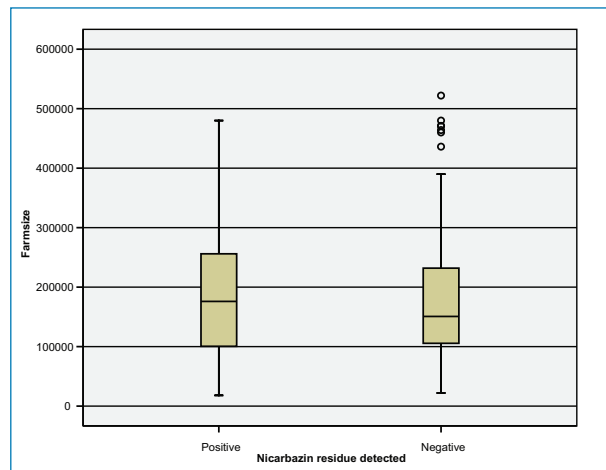
This relates only to farms who use nicarbazine.

Question 2: Number of birds placed on the whole farm

Overall	
Count	252
Minimum	18000
Percentile 25	103050
Median	156056
Percentile 75	247750
Maximum	522000
Mean	180494
Std Deviation	108277



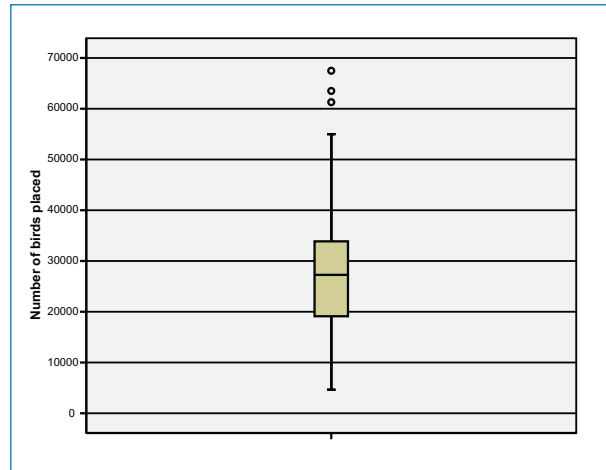
Positive	
Count	41
Minimum	18000
Percentile 25	99000
Median	176000
Percentile 75	260500
Maximum	480000
Mean	183020
Std Deviation	108255



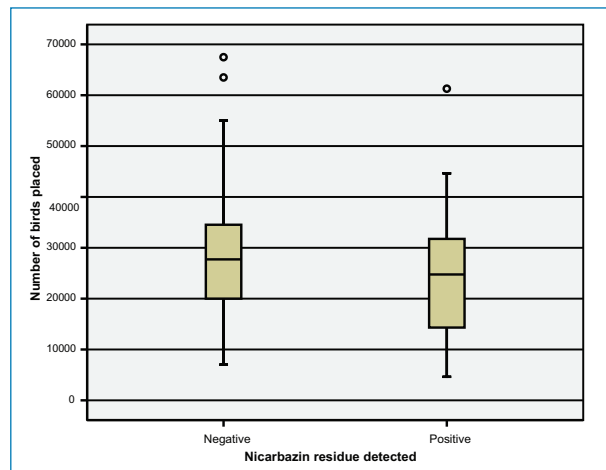
Negative	
Count	211
Minimum	22000
Percentile 25	105000
Median	150710
Percentile 75	233847
Maximum	522000
Mean	180003
Std Deviation	108532

Question 4: (House details) Number of Birds Placed

Overall	
Count	252
Minimum	4625
Percentile 25	19106
Median	27272
Percentile 75	33938
Maximum	67484
Mean	27492
Std Deviation	11997



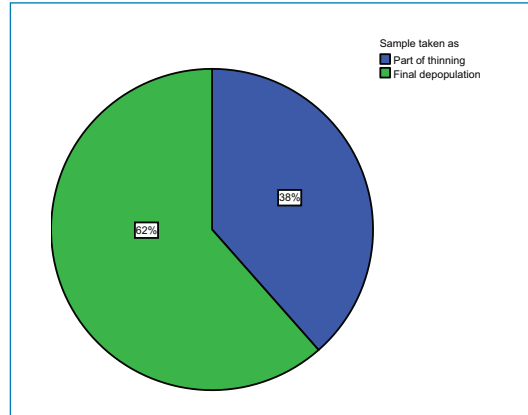
Positive	
Count	41
Minimum	4625
Percentile 25	14305
Median	24750
Percentile 75	32688
Maximum	61290
Mean	24367
Std Deviation	11908



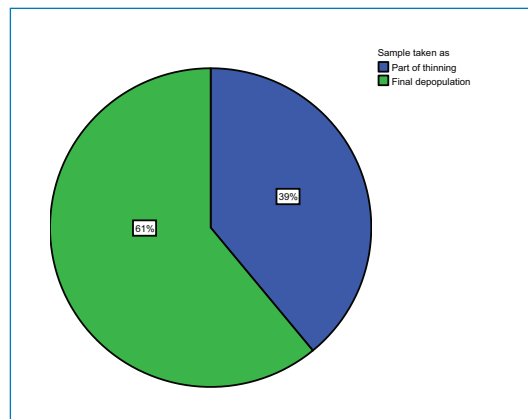
Negative	
Count	211
Minimum	7000
Percentile 25	20000
Median	27720
Percentile 75	34817
Maximum	67484
Mean	28100
Std Deviation	11948

Question 6: Was the sample taken as:

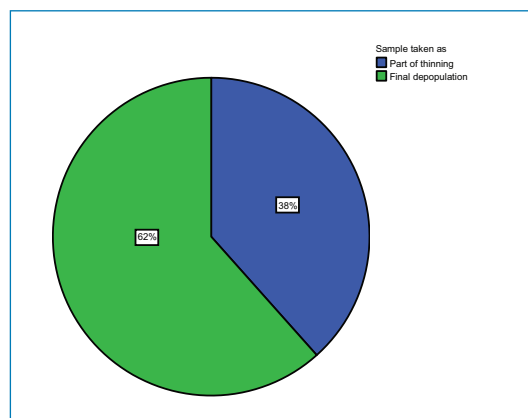
Overall	
	Percent
Part of thinning	38% (97)
Final depopulation	61% (155)
Total	100% (252)



Positive	
	Percent
Part of thinning	39% (16)
Final depopulation	61% (25)
Total	100% (41)

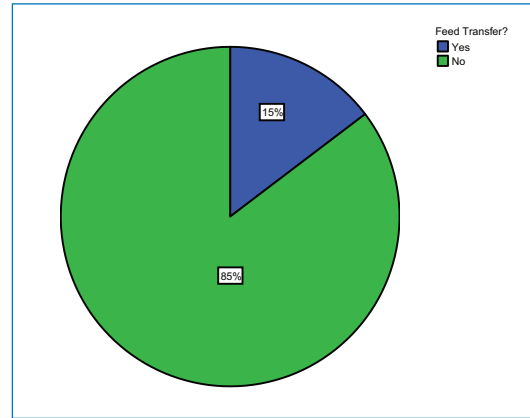


Negative	
	Percent
Part of thinning	38% (81)
Final depopulation	62% (130)
Total	100% (211)

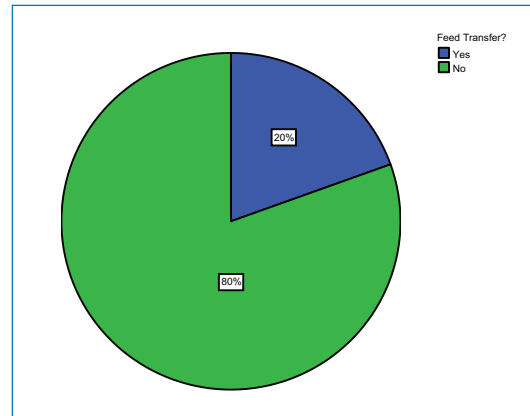


Question 9: Was any feed transferred to this farm from another farm during this crop?

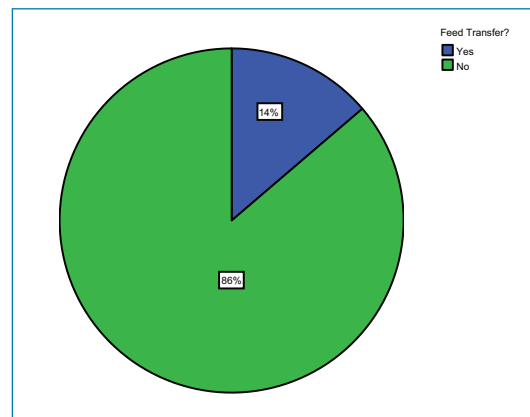
Overall	
	Percent
Yes	15% (37)
No	85% (215)
Total	100% (252)



Positive	
	Percent
Yes	20% (8)
No	80% (33)
Total	100% (41)

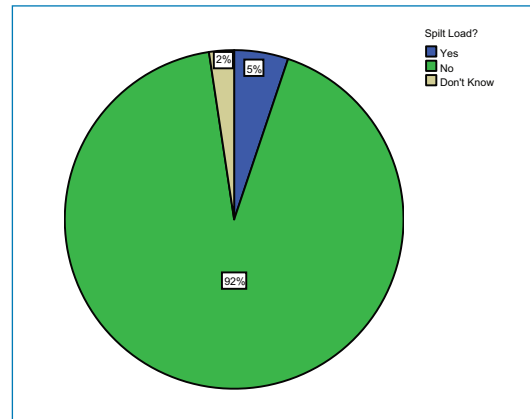


Negative	
	Percent
Yes	14% (29)
No	86% (182)
Total	100% (211)

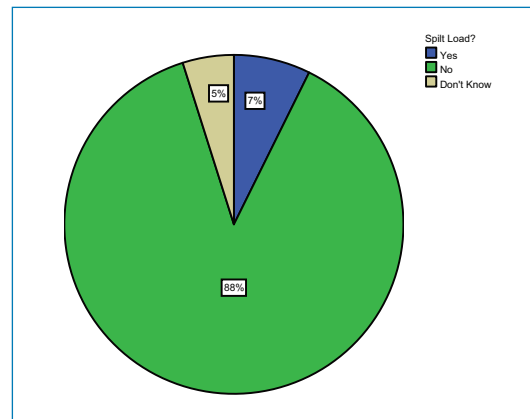


Question 11: Did this house receive any feed deliveries as either a mixed feed delivery or spilt load where one part of the load contained Nicarbazine (*Maxiban*) and the other part of the load did not contain Nicarbazine (*Maxiban*) e.g. finisher or withdrawl?

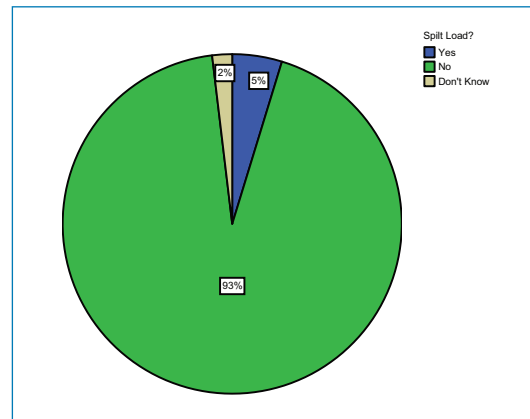
Overall	
	Percent
Yes	5% (13)
No	93% (233)
Don't know	2% (6)
Total	100% (252)



Positive	
	Percent
Yes	7% (3)
No	88% (36)
Don't know	5% (2)
Total	100% (41)

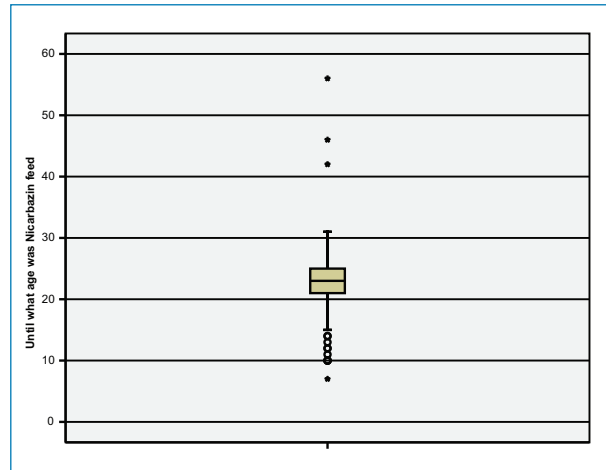


Negative	
	Percent
Yes	5% (10)
No	93% (197)
Don't know	2% (4)
Total	100% (211)

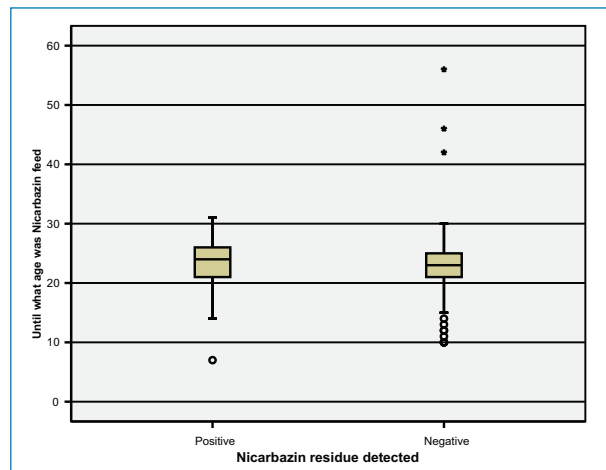


Question 12: Up to what age, in days, did you feed Nicarbazine (*Maxiban*)?

Overall	
Count	252
Minimum	7
Percentile 25	21
Median	23
Percentile 75	25
Maximum	56
Mean	23
Std Deviation	5



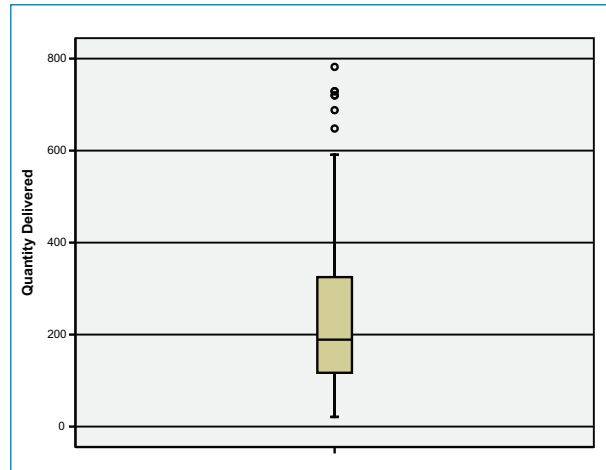
Positive	
Count	41
Minimum	7
Percentile 25	21
Median	24
Percentile 75	26
Maximum	31
Mean	23
Std Deviation	4



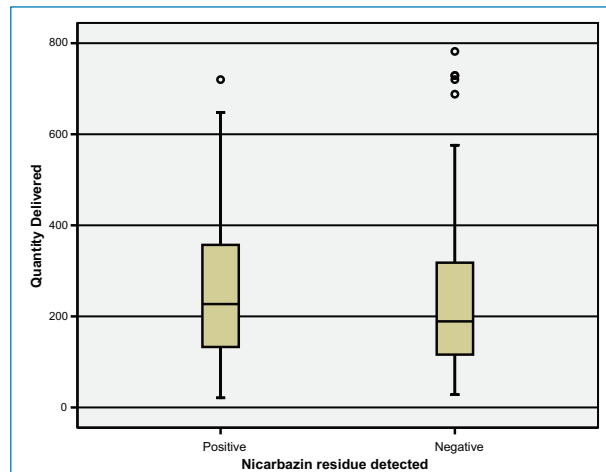
Negative	
Count	211
Minimum	10
Percentile 25	21
Median	23
Percentile 75	25
Maximum	56
Mean	23
Std Deviation	5

Question 13: What was quantity of *Maxiban* feed delivered for the whole farm in tonnes?

Overall	
Count	245
Minimum	21
Percentile 25	117
Median	189
Percentile 75	333
Maximum	782
Mean	239
Std Deviation	160



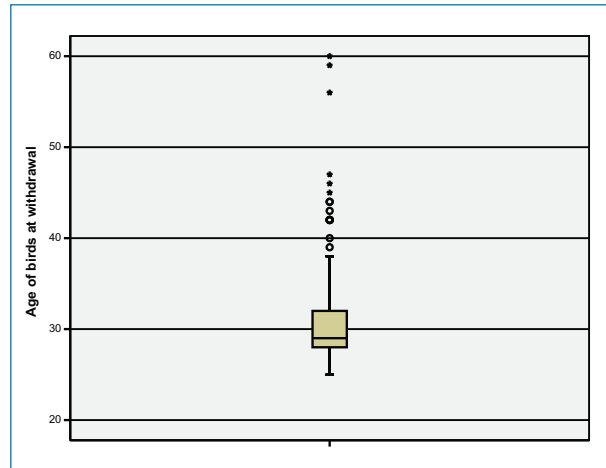
Positive	
Count	40
Minimum	21
Percentile 25	128
Median	227
Percentile 75	362
Maximum	720
Mean	271
Std Deviation	188



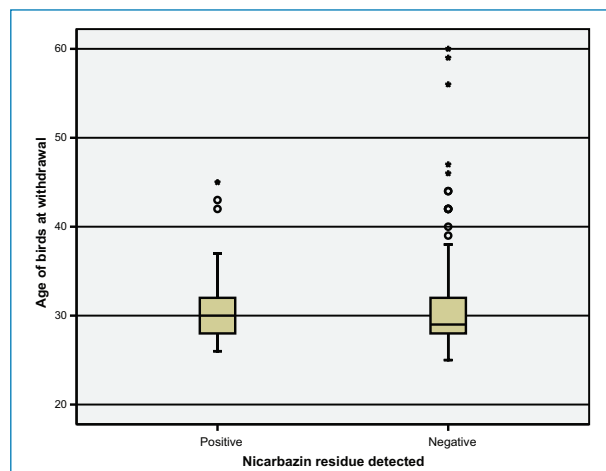
Negative	
Count	205
Minimum	28
Percentile 25	115
Median	189
Percentile 75	320
Maximum	782
Mean	233
Std Deviation	155

Question 14: When the withdrawal diet was started, how old were the birds in days?

Overall	
Count	252
Minimum	25
Percentile 25	28
Median	29
Percentile 75	32
Maximum	60
Mean	31
Std Deviation	5



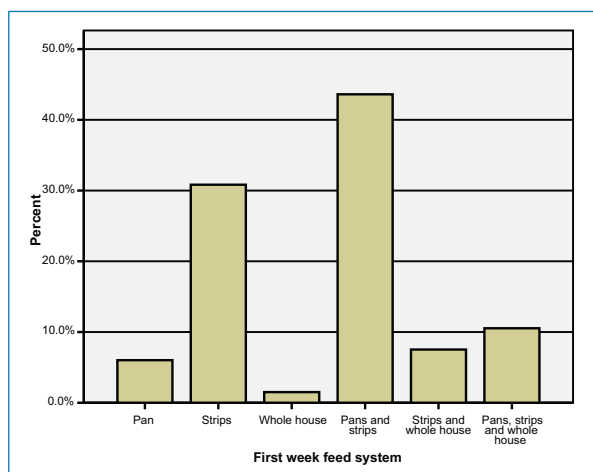
Positive	
Count	41
Minimum	26
Percentile 25	28
Median	30
Percentile 75	33
Maximum	45
Mean	31
Std Deviation	4



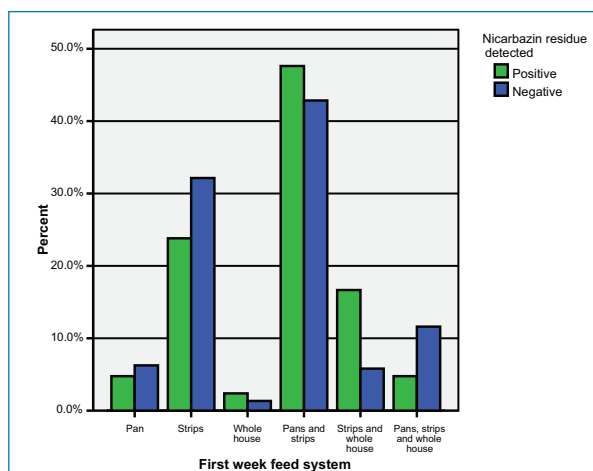
Negative	
Count	211
Minimum	25
Percentile 25	28
Median	29
Percentile 75	32
Maximum	60
Mean	31
Std Deviation	5

Question 15: Which system is used for the first week feed?

Overall	
	Percent
Pan	6% (15)
Strips	30% (76)
Whole house	1% (2)
Pans and strips	45% (112)
Strips and whole house	7% (18)
Pans, strips and whole house	11% (27)
Total	100% (250)



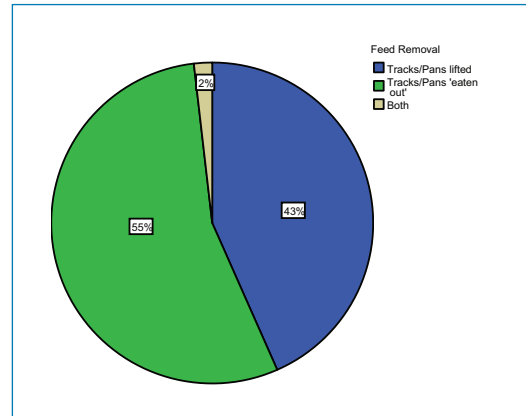
Positive	
	Percent
Pan	5% (2)
Strips	24% (10)
Whole house	2% (1)
Pans and strips	46% (19)
Strips and whole house	17% (7)
Pans, strips and whole house	5% (2)
Total	100% (41)



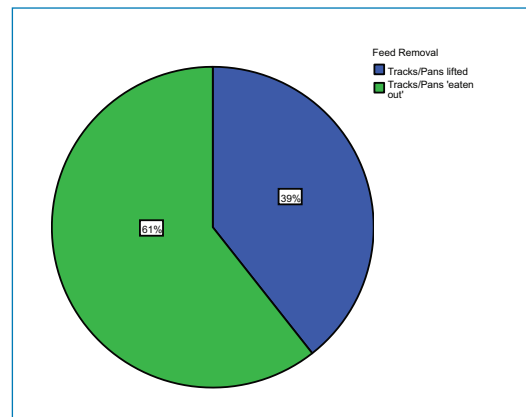
Overall	
	Percent
Pan	6% (13)
Strips	32% (66)
Whole house	1% (1)
Pans and strips	45% (93)
Strips and whole house	5% (11)
Pans, strips and whole house	12% (25)
Total	100% (209)

Question 16: How was feed removed before the birds were sent for processing?

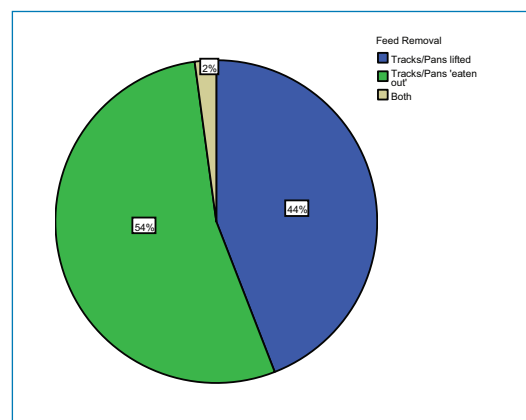
Overall	
	Percent
Tracks/Pans lifted	43% (95)
Tracks/Pans 'eaten out'	55% (120)
Both	2% (4)
Total	100% (219)



Positive	
	Percent
Tracks/Pans lifted	39% (13)
Tracks/Pans 'eaten out'	81% (20)
Both	0% (0)
Total	100% (33)

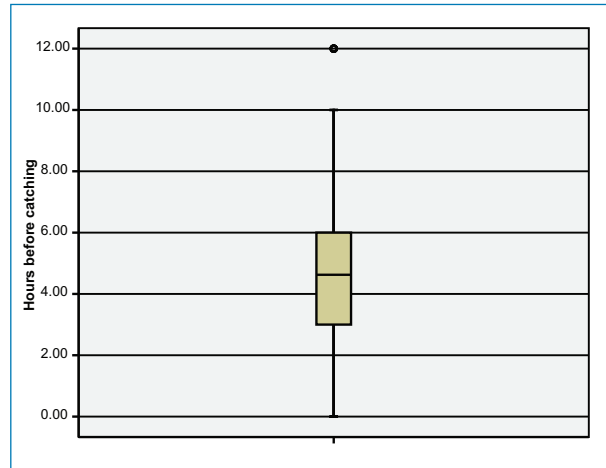


Negative	
	Percent
Tracks/Pans lifted	44% (82)
Tracks/Pans 'eaten out'	54% (100)
Both	2% (4)
Total	100% (186)

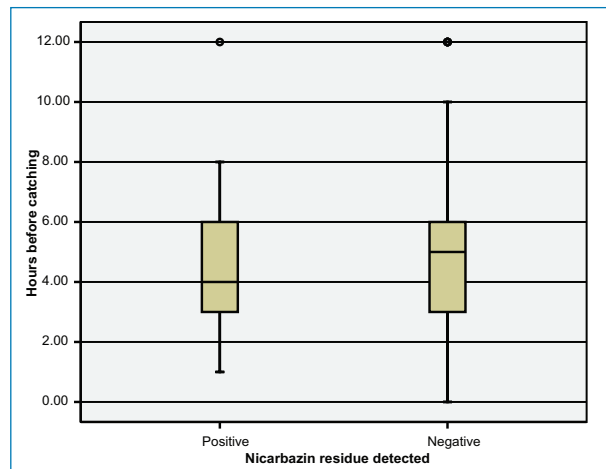


Question 17: How long were the birds not presented with feed on farm before catching? (Number of hours)?

Overall	
	Hours before catching
Count	252
Minimum	0.0
Percentile 25	3.0
Median	4.6
Percentile 75	6.0
Maximum	12.0
Mean	4.75
Std Deviation	2.5



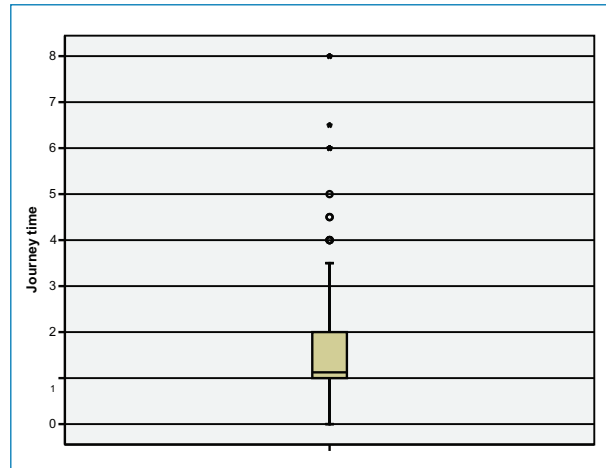
Positive	
	Hours before catching
Count	41
Minimum	1.0
Percentile 25	3.0
Median	4.0
Percentile 75	6.0
Maximum	12.0
Mean	4.6
Std Deviation	2.3



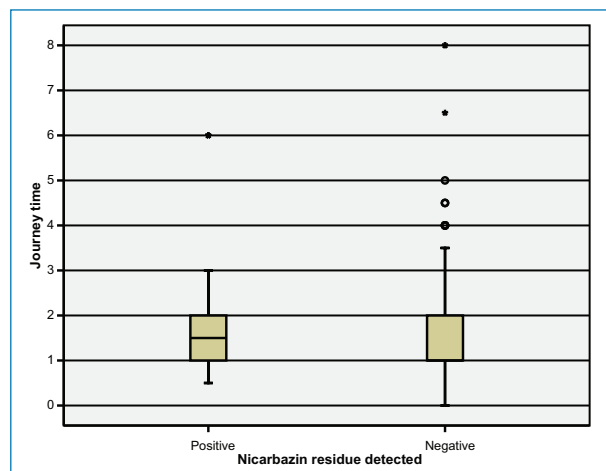
Negative	
	Hours before catching
Count	211
Minimum	0.0
Percentile 25	3.0
Median	5.0
Percentile 75	6.0
Maximum	12.0
Mean	4.8
Std Deviation	2.6

Question 18: What was the approximate journey time to the processing plant, in hours?

Overall	
	Journey time
Count	252
Minimum	0.0
Percentile 25	1.0
Median	1.1
Percentile 75	2.0
Maximum	8.0
Mean	1.6
Std Deviation	1.2



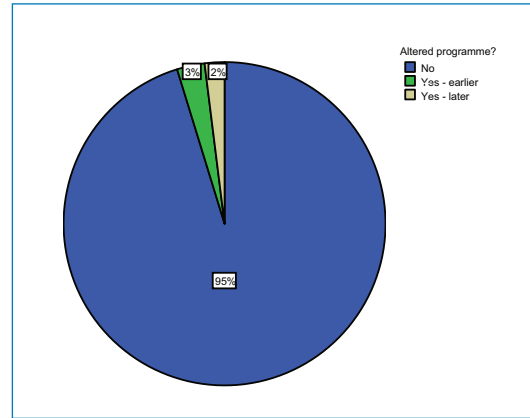
Positive	
	Journey time
Count	41
Minimum	0.5
Percentile 25	1.0
Median	1.5
Percentile 75	2.0
Maximum	6.0
Mean	1.7
Std Deviation	1.4



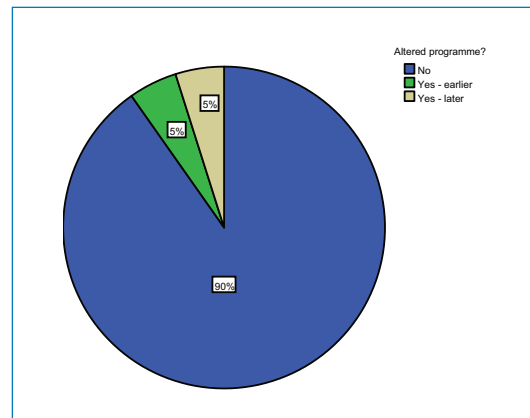
Negative	
	Journey time
Count	211
Minimum	0.0
Percentile 25	1.0
Median	1.0
Percentile 75	2.0
Maximum	8.0
Mean	1.5
Std Deviation	1.1

Question 19: Were there any ‘last minute’ changes in the programme and catching plan that altered the date sent for processing?

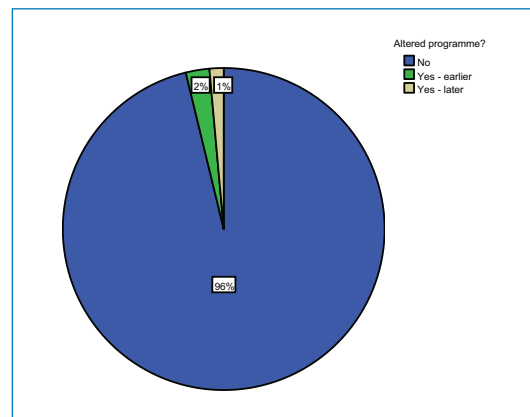
Overall	
	Percent
No	95% (240)
Yes - Earlier	3% (7)
Yes - Later	2% (5)
Total	100% (252)



Positive	
	Percent
No	90% (37)
Yes - Earlier	5% (2)
Yes - Later	5% (2)
Total	100% (41)

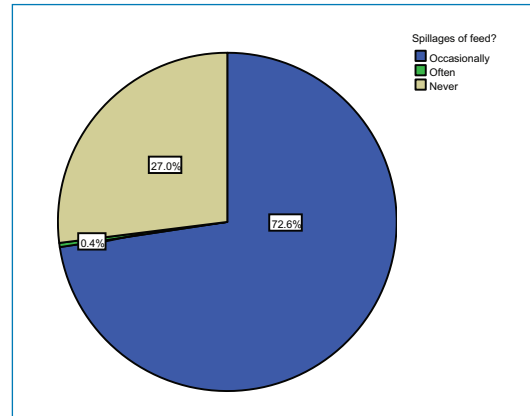


Negative	
	Percent
No	96% (203)
Yes - Earlier	2% (5)
Yes - Later	1% (3)
Total	100% (211)

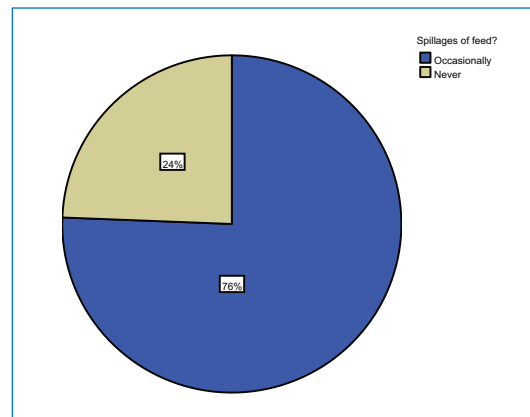


Question 20: Does your feed distribution system produce spillages of feed?

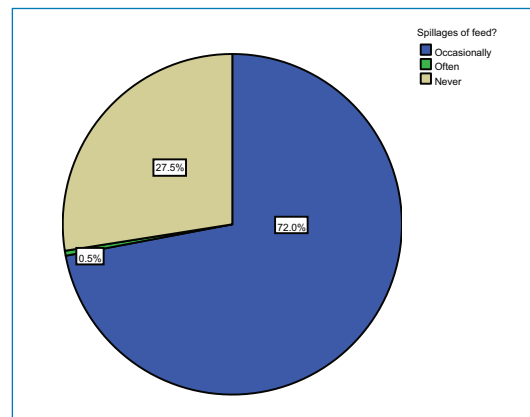
Overall	
	Percent
Occasionally	73% (183)
Often	1% (1)
Never	27% (68)
Total	100% (252)



Positive	
	Percent
Occasionally	76% (31)
Often	0% (0)
Never	24% (10)
Total	100% (41)

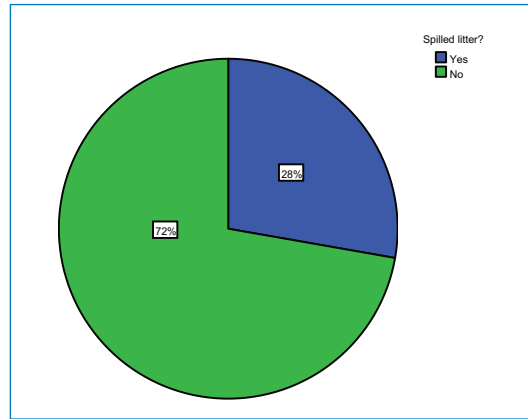


Negative	
	Percent
Occasionally	72% (152)
Often	1% (1)
Never	28% (58)
Total	100% (211)

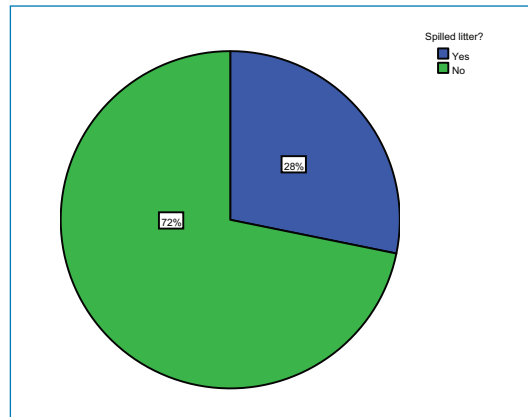


Question 21: Had any feed spilled in the litter during this crop?

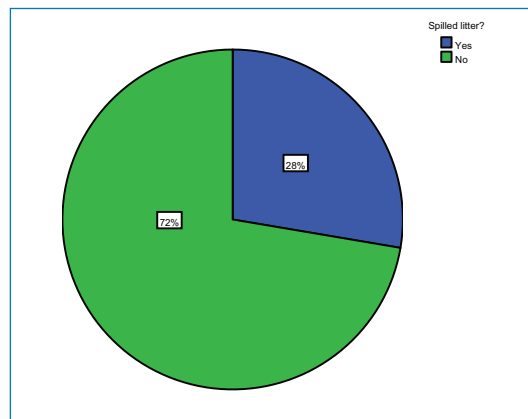
Overall	
	Percent
Yes	28% (68)
No	72% (177)
Total	100% (245)



Positive	
	Percent
Yes	28% (11)
No	72% (28)
Total	100% (39)

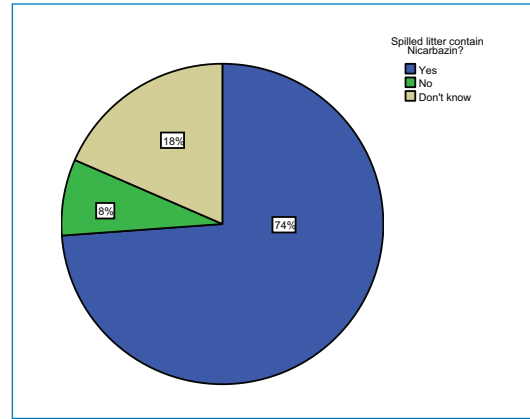


Negative	
	Percent
Yes	28% (57)
No	72% (149)
Total	100% (206)

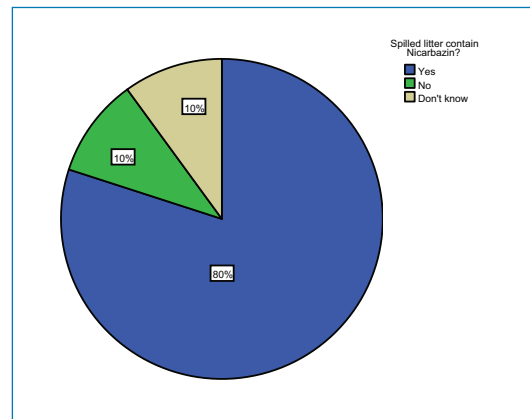


Question 21a: If yes, did the spilled feed contain Nicarbazine (*Maxiban*)?

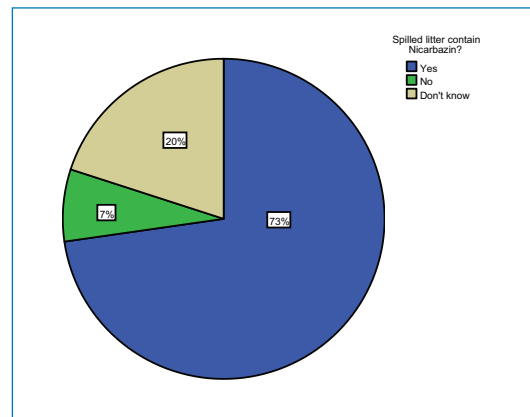
Overall	
	Percent
Yes	74% (48)
No	8% (5)
Don't know	19% (12)
Total	100% (65)



Positive	
	Percent
Yes	80% (8)
No	10% (1)
Don't know	10% (1)
Total	100% (10)

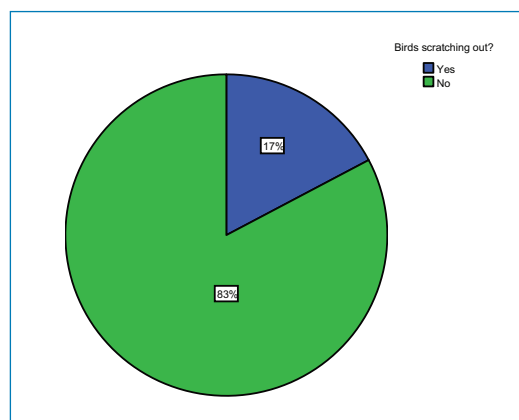


Negative	
	Percent
Yes	73% (40)
No	7% (4)
Don't know	20% (11)
Total	100% (55)

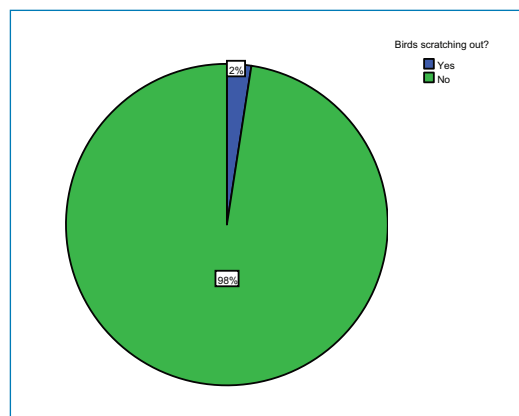


Question 22: Had the birds been scratching out the feed from the feeders?

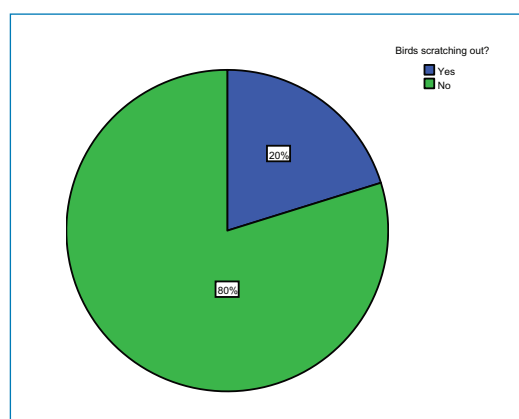
Overall	
	Percent
Yes	17% (43)
No	83% (206)
Total	100% (249)



Positive	
	Percent
Yes	2% (1)
No	98% (40)
Total	100% (41)



Negative	
	Percent
Yes	20% (42)
No	80% (166)
Total	100% (208)

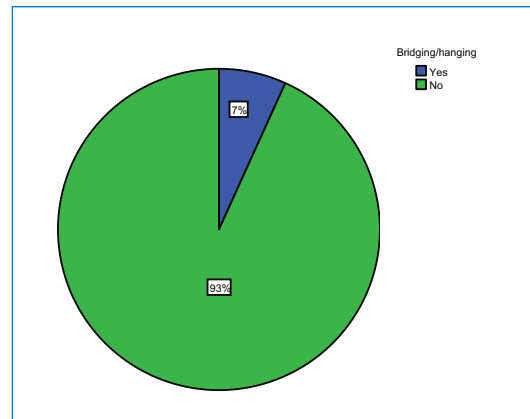


		Have the birds been scratching out the feed from the feeder?		
		Yes	No	Total
Nicarbazin Residue greater than LOD	Positive	2.3% (1)	19.4% (40)	16.5% (41)
	Negative	97.7% (42)	80.6% (166)	83.5% (208)
	Total	100% (43)	100% (206)	100% (249)

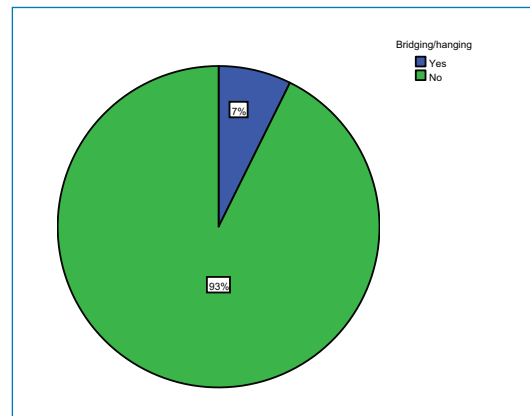
Farms in which birds scratch the feed out of the feeder are significantly less likely to have positive Nicarbazin residues ($p < 0.01$).

Question 23: Was there any 'observed' bridging and/or hanging up in the bin?

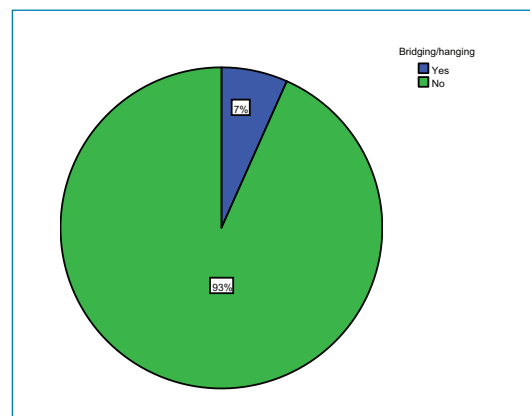
Overall	
	Percent
Yes	7% (17)
No	93% (234)
Total	100% (251)



Positive	
	Percent
Yes	7% (3)
No	93% (38)
Total	100% (41)

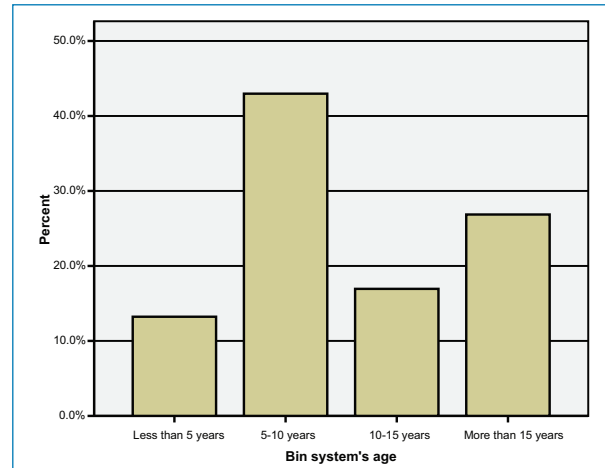


Negative	
	Percent
Yes	7% (14)
No	93% (196)
Total	100% (210)

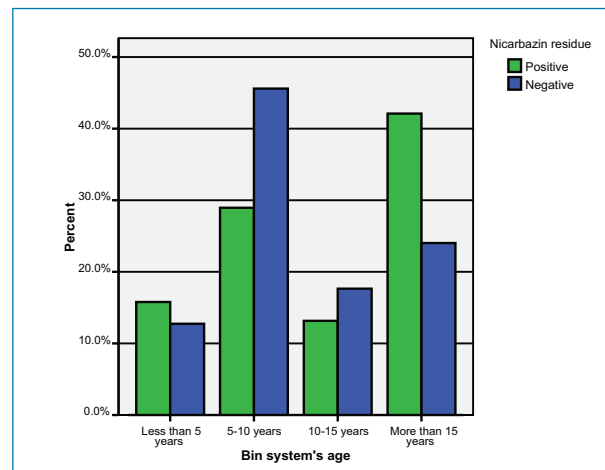


Question 24: How old is the bin system on your farm?

Overall	
	Percent
Less than 5 years	13% (32)
5-10 years	43% (104)
10-15 years	17% (41)
More than 15 years	27% (65)
Total	100% (242)



Positive	
	Percent
Less than 5 years	16% (6)
5-10 years	29% (11)
10-15 years	13% (5)
More than 15 years	42% (16)
Total	100% (38)



Negative	
	Percent
Less than 5 years	13% (26)
5-10 years	46% (93)
10-15 years	18% (36)
More than 15 years	24% (49)
Total	100% (204)

A difference exists between the percentage of bins older than 15 years for the positive and negative groups (12% of positive versus 24% of negative older than 15 years). To analysis this all the bin's have been grouped into those less than 15 years and those greater than 15 years.

		Age of Bin System		
		Les than 15 years	Greater than 15 years	Total
Nicarbazin Residue greater than LOD	Positive	12.4% (22)	24.6% (16)	15.7% (38)
	Negative	87.6% (155)	75.4% (49)	84.3% (204)
	Total	100% (177)	100% (65)	100% (242)

A significant difference exists between bin systems that are over 15 years old and those younger ($p < 0.05$).

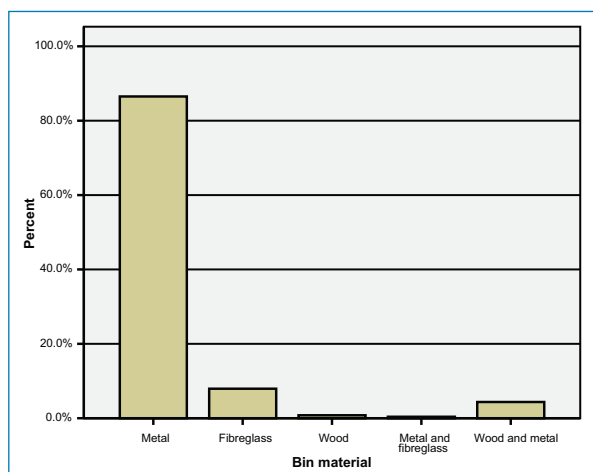
Bridging and/or hanging up in the bin vs Age of Bin - Whole Sample

		Age of Bin System		
		Less than 15 years	More than 15 years	Total
Bridging/hanging	Yes	3.4% (6)	16.9% (11)	7.1% (17)
	No	96.6% (170)	83.1% (54)	92.9% (224)
	Total	100% (176)	100% (65)	100% (241)

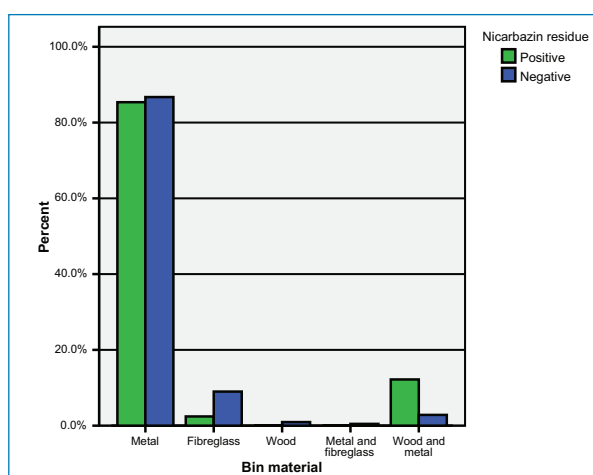
Bin systems less than 15 years old are significantly less likely to have bridging and/or hanging up reported than those 15 years and older ($p < 0.001$).

Question 25: What is the bin of the sampled house made from?

Overall	
	Percent
Metal	87% (218)
Fibreglass	8% (20)
Wood	1% (2)
Metal and fibreglass	0.5% (1)
Wood and metal	4% (11)
Total	100% (252)



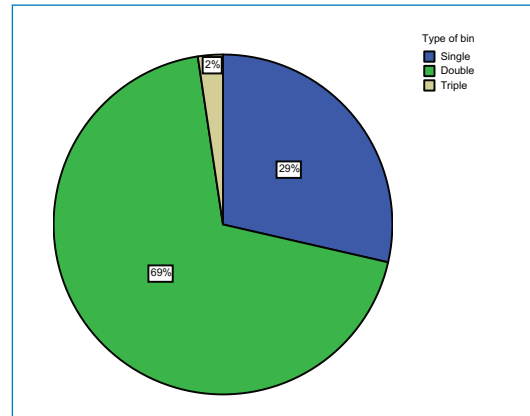
Positive	
	Percent
Metal	85% (35)
Fibreglass	2% (1)
Wood	0% (0)
Metal and fibreglass	0% (0)
Wood and metal	12% (5)
Total	100% (41)



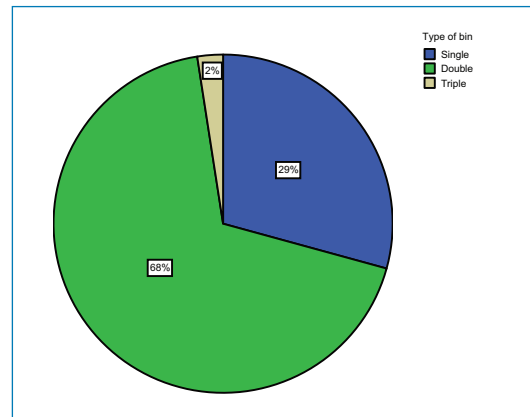
Overall	
	Percent
Metal	87% (183)
Fibreglass	9% (19)
Wood	1% (2)
Metal and fibreglass	1% (1)
Wood and metal	3% (6)
Total	100% (211)

Question 27: What type of bins supply compound feed to the sampled house?

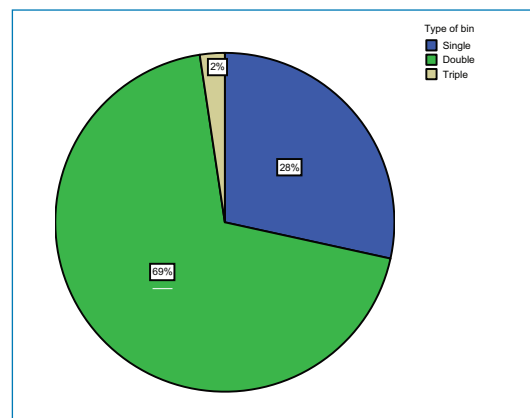
Overall	
	Percent
Single	29% (72)
Double	69% (174)
Triple	2% (6)
Total	100% (252)



Positive	
	Percent
Single	29% (12)
Double	68% (28)
Triple	2% (1)
Total	100% (41)

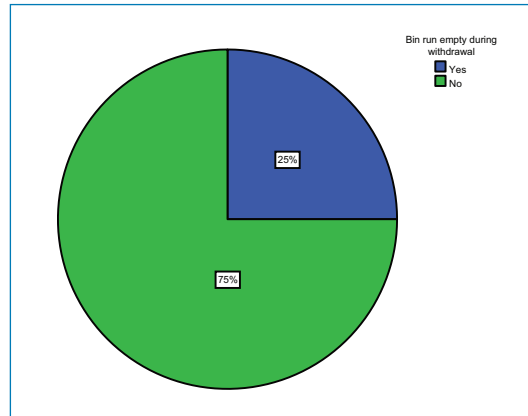


Negative	
	Percent
Single	28% (60)
Double	69% (146)
Triple	2% (5)
Total	100% (211)

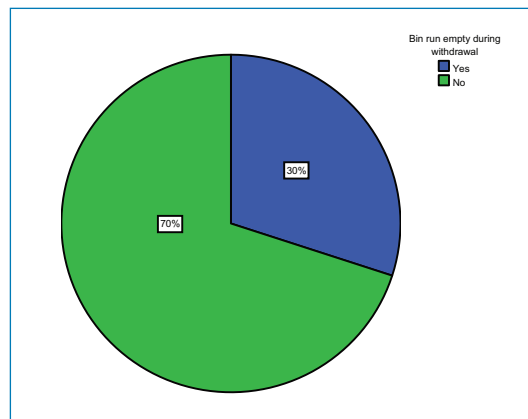


Question 28: For Single Bin Systems ONLY. Did the feed bin run empty at any time during the withdrawal period just prior to slaughter?

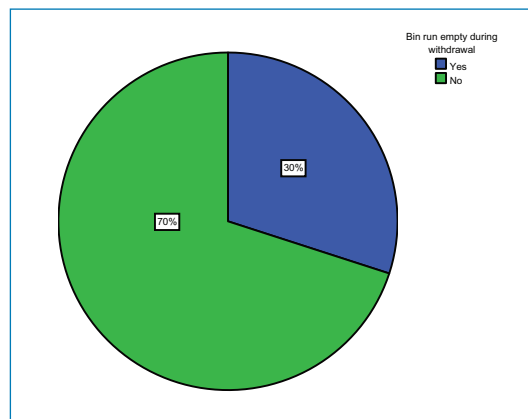
Overall	
	Percent
Yes	29% (21)
No	71% (51)
Total	100% (72)



Positive	
	Percent
Yes	25% (3)
No	75% (9)
Total	100% (12)

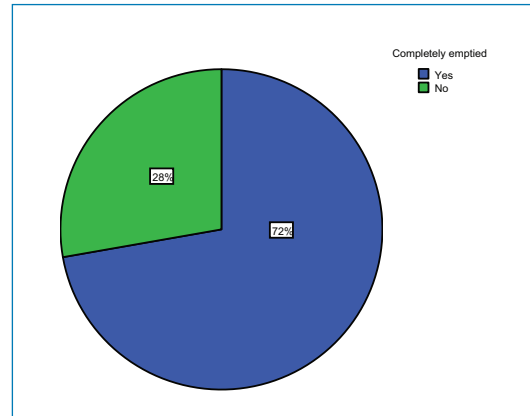


Negative	
	Percent
Yes	30% (18)
No	70% (42)
Total	100% (60)

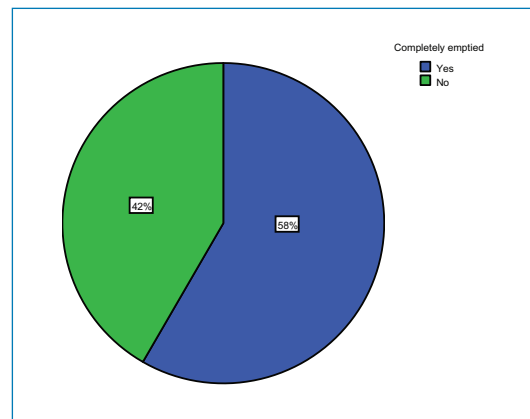


Question 29: For single bin systems ONLY: Was the feed bin completely emptied between delivery of Nicarbazin (*Maxiban*) and 5 days before slaughter?

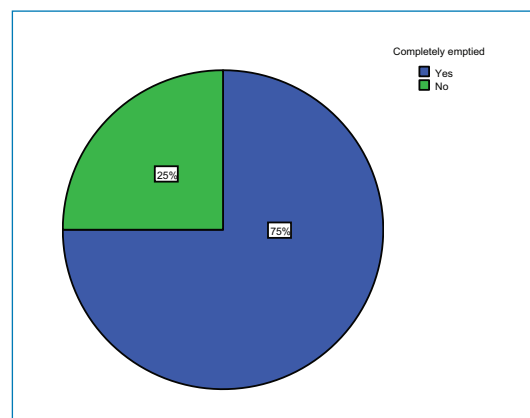
Overall	
	Percent
Yes	72% (52)
No	28% (20)
Total	100% (72)



Positive	
	Percent
Yes	58% (7)
No	42% (5)
Total	100% (12)

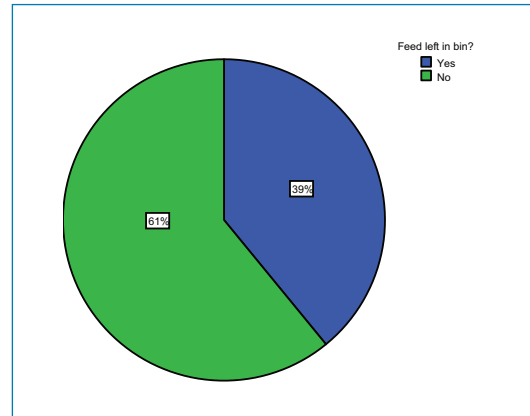


Negative	
	Percent
Yes	75% (45)
No	25% (15)
Total	100% (60)

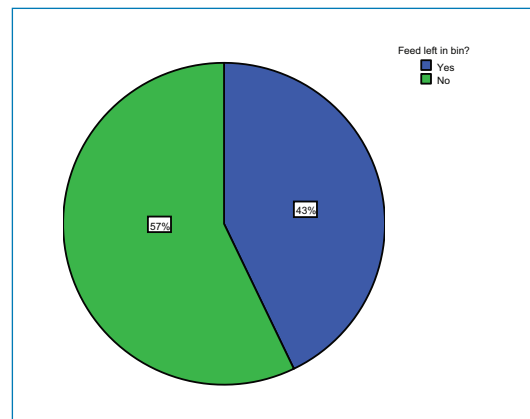


Question 30: For double bin systems ONLY: Was any feed left in the bin from the last crop?

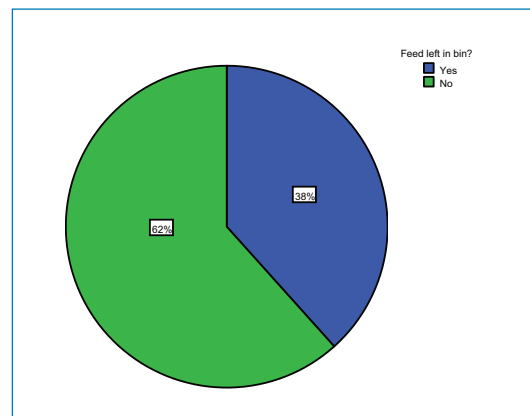
Overall	
	Percent
Yes	39% (68)
No	61% (106)
Total	100% (174)



Positive	
	Percent
Yes	43% (12)
No	57% (16)
Total	100% (28)

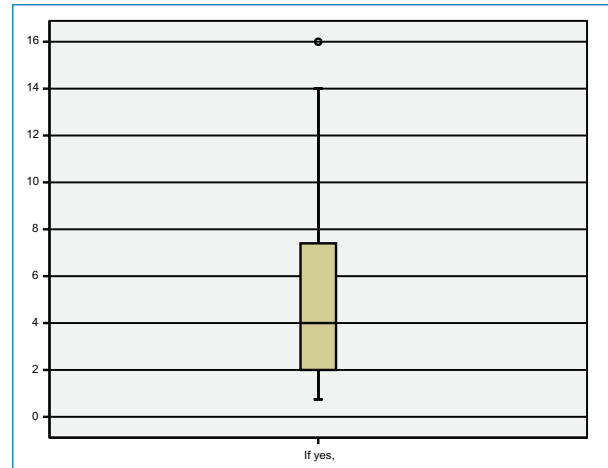


Negative	
	Percent
Yes	38% (56)
No	62% (90)
Total	100% (146)

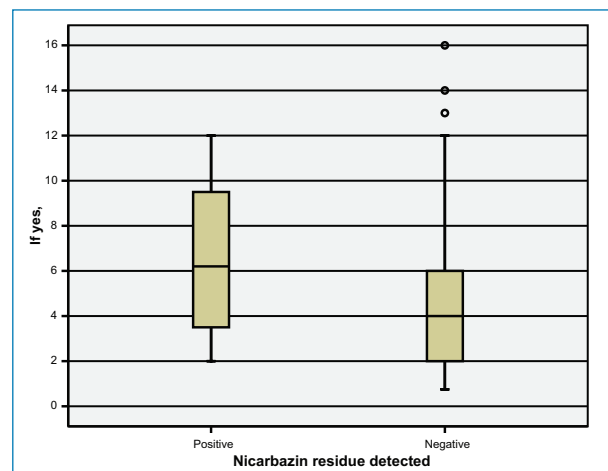


Question 30a: For double bin systems ONLY: If yes, how much would you estimate was left (in tonnes)?

Overall	
	Left (in tonnes)?
Count	71
Minimum	1
Percentile 25	2
Median	4
Percentile 75	8
Maximum	16
Mean	5
Std Deviation	4



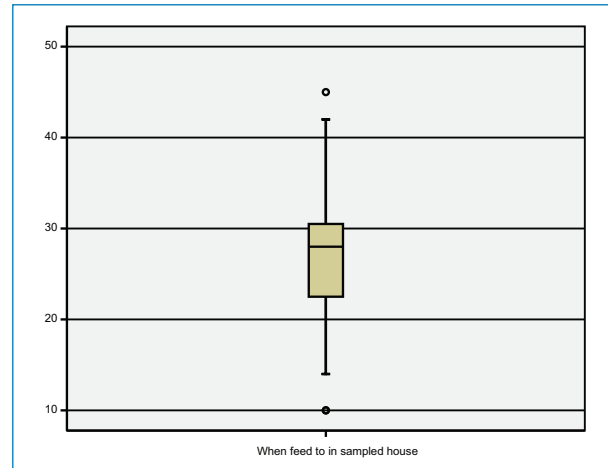
Positive	
	Left (in tonnes)?
Count	12
Minimum	2
Percentile 25	3
Median	6
Percentile 75	10
Maximum	12
Mean	6
Std Deviation	3



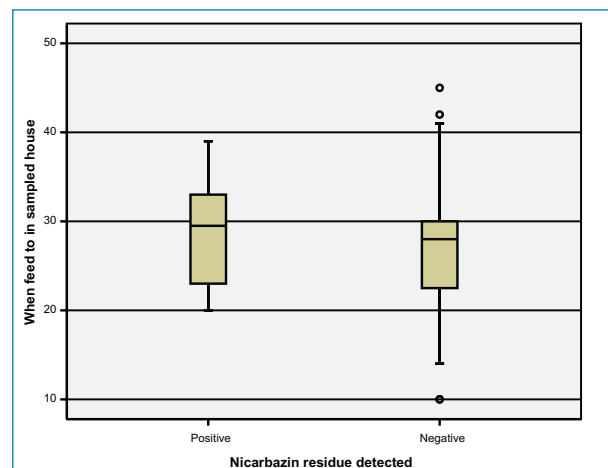
Negative	
	Left (in tonnes)?
Count	59
Minimum	1
Percentile 25	2
Median	4
Percentile 75	6
Maximum	16
Mean	5
Std Deviation	4

Question 30b: For double bin systems ONLY: When was this fed to the birds in the sampled house (age in days)?

Overall	
	Age fed?
Count	71
Minimum	10
Percentile 25	22
Median	28
Percentile 75	31
Maximum	45
Mean	28
Std Deviation	7



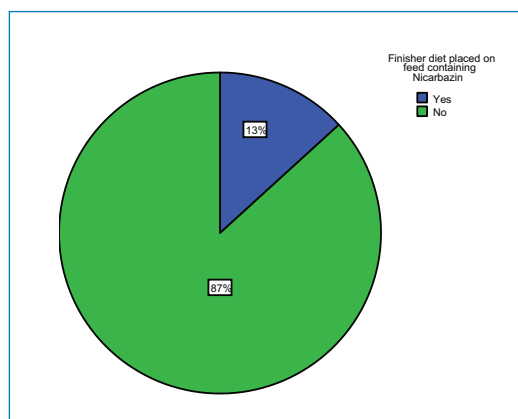
Positive	
	Age fed?
Count	12
Minimum	20
Percentile 25	23
Median	30
Percentile 75	34
Maximum	39
Mean	29
Std Deviation	6



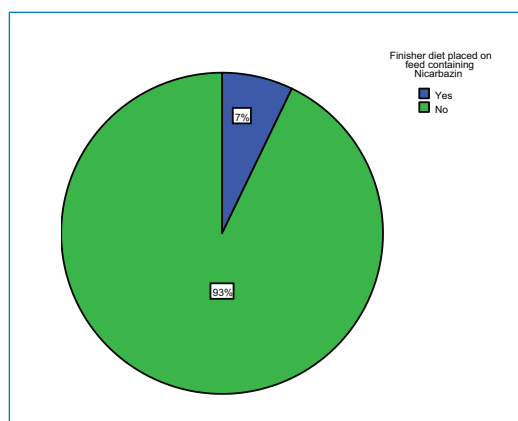
Negative	
	Age fed?
Count	59
Minimum	10
Percentile 25	22
Median	28
Percentile 75	30
Maximum	45
Mean	27
Std Deviation	7

Question 31a: For Double Bins only: During this crop was Finisher diet placed in a bin on top of feed containing Nicarbazine (*Maxiban*)?

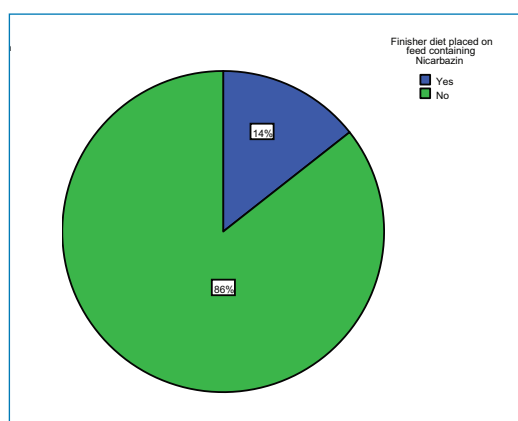
Overall	
	Percent
Yes	13% (23)
No	87% (151)
Total	100% (174)



Positive	
	Percent
Yes	7% (2)
No	93% (26)
Total	100% (28)

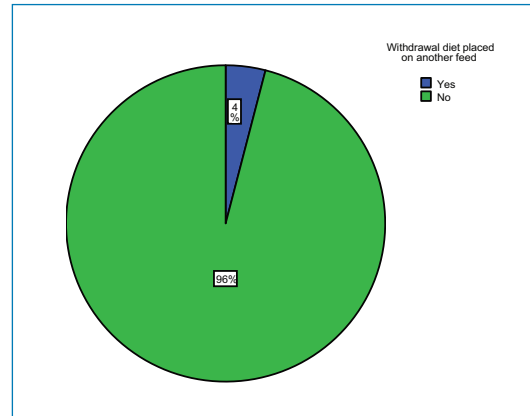


Negative	
	Percent
Yes	14% (21)
No	86% (125)
Total	100% (146)

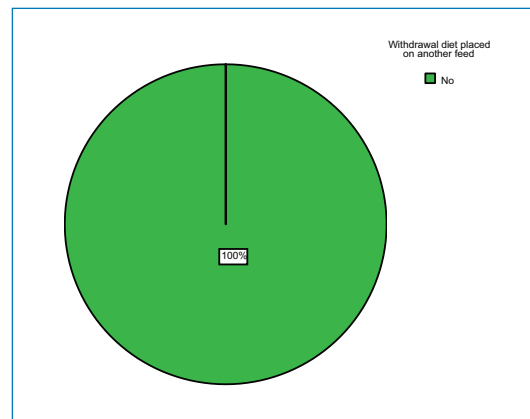


Question 31b: For Double Bins only: During this crop was withdrawal diet placed in a bin on top of another feed?

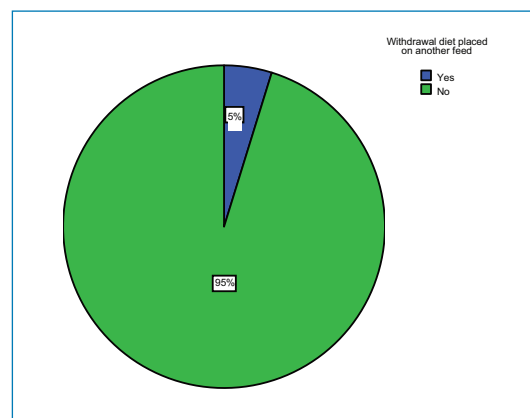
Overall	
	Percent
Yes	4% (7)
No	96% (167)
Total	100% (174)



Positive	
	Percent
Yes	0% (0)
No	100% (28)
Total	100% (28)

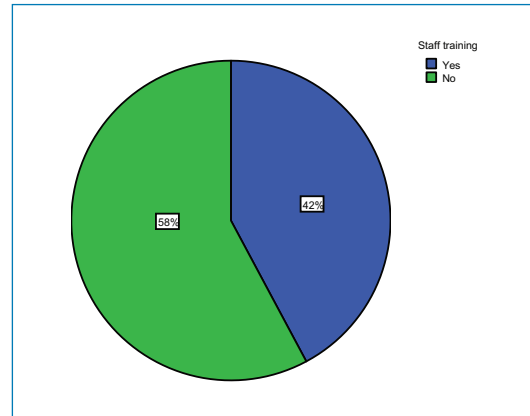


Negative	
	Percent
Yes	5% (7)
No	95% (139)
Total	100% (146)

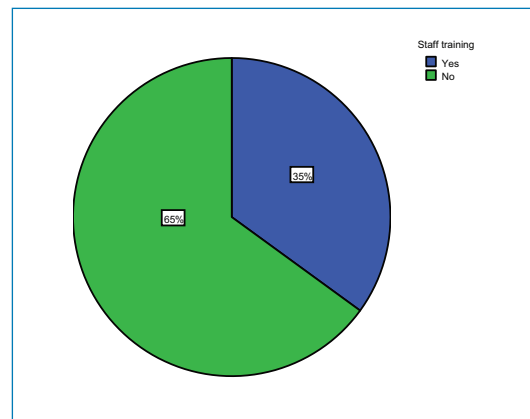


Question 32: Have you or any of your staff at this site attended the Elanco training on the use of Nicarbazin (*Maxiban*)?

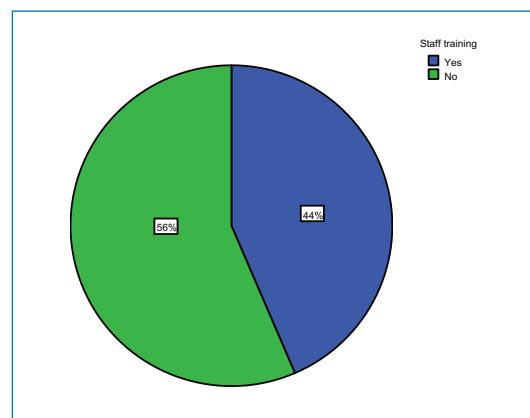
Overall	
	Percent
Yes	42% (105)
No	58% (144)
Total	100% (249)



Positive	
	Percent
Yes	35% (14)
No	65% (26)
Total	100% (40)

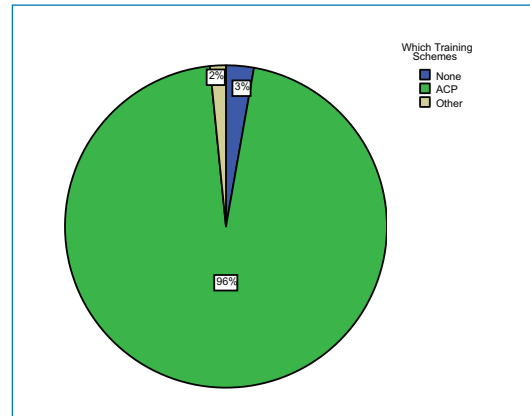


Negative	
	Percent
Yes	44% (91)
No	56% (118)
Total	100% (209)

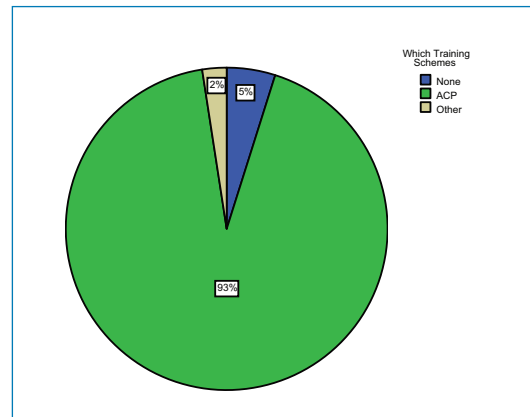


Question 33: Which assurance schemes does your farm belong to?

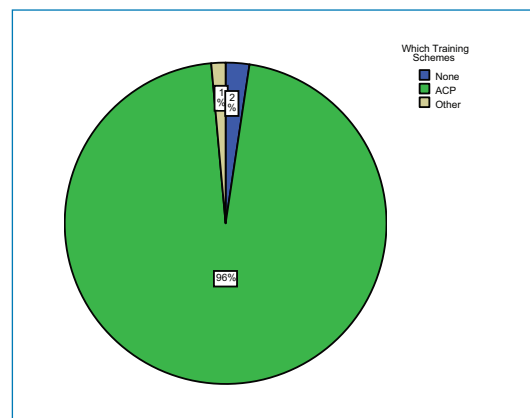
Overall	
	Percent
None	3% (7)
ACP	96% (240)
Other	2% (4)
Total	100% (251)



Positive	
	Percent
None	5% (2)
ACP	93% (38)
Other	2% (1)
Total	100% (41)

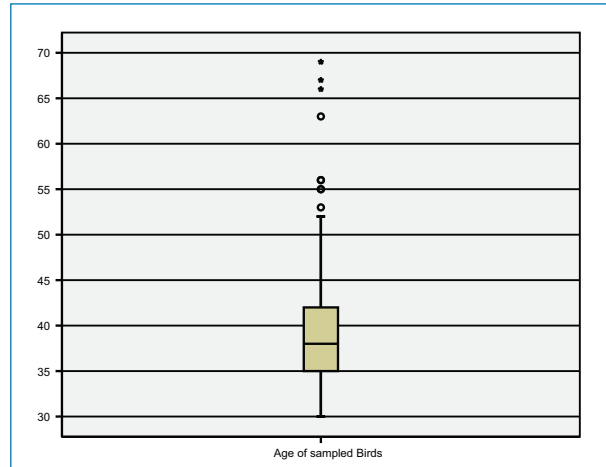


Negative	
	Percent
None	2% (5)
ACP	96% (202)
Other	1% (3)
Total	100% (210)

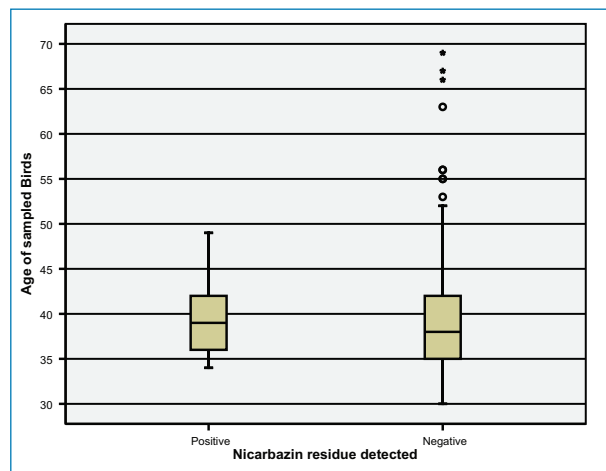


Derived Result: Age of sampled bird

Overall	
	Age of sampled birds
Count	252
Minimum	30
Percentile 25	35
Median	38
Percentile 75	42
Maximum	69
Mean	40
Std Deviation	7



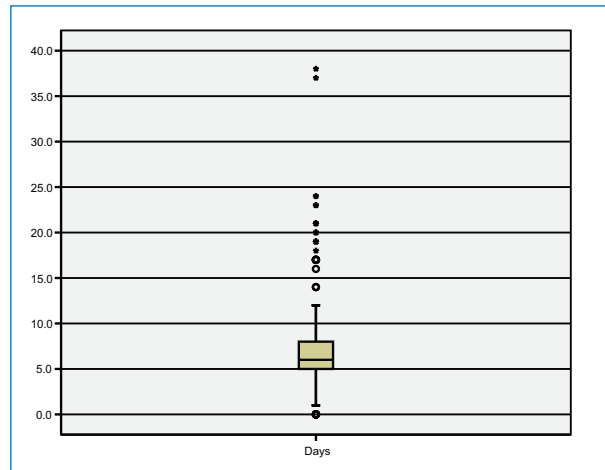
Positive	
	Age of sampled birds
Count	41
Minimum	34
Percentile 25	36
Median	39
Percentile 75	42
Maximum	49
Mean	40
Std Deviation	5



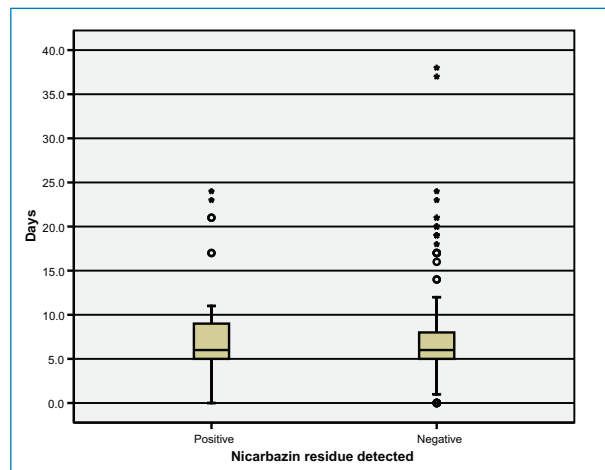
Negative	
	Age of sampled birds
Count	211
Minimum	30
Percentile 25	35
Median	38
Percentile 75	42
Maximum	69
Mean	40
Std Deviation	7

Derived results: Days between finishing the use of Nicarbazin and beginning on the withdrawal diet.

Overall	
Count	252
Minimum	0.0
Percentile 25	5.0
Median	6.0
Percentile 75	8.0
Maximum	38.0
Mean	7.5
Std Deviation	5.4



Positive	
Count	41
Minimum	0.0
Percentile 25	4.5
Median	6.0
Percentile 75	9.0
Maximum	24.0
Mean	8.1
Std Deviation	5.9



Negative	
Count	211
Minimum	0.0
Percentile 25	5.0
Median	6.0
Percentile 75	8.0
Maximum	38.0
Mean	7.4
Std Deviation	5.3

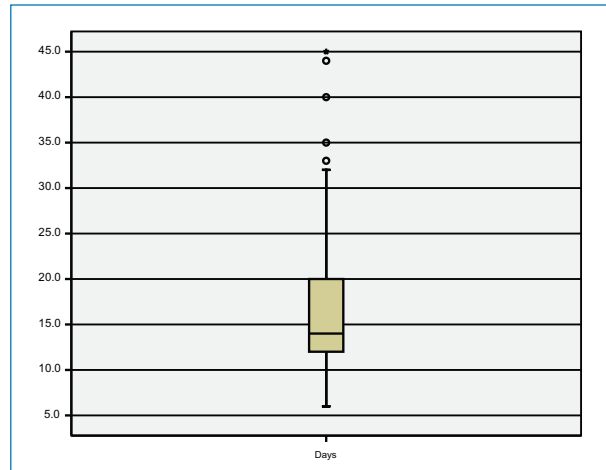
3 days should be left between Nicarbazin and withdrawal diet. The results have been grouped into 3 days and less and more than 3 days.

		Days between Nicarbazin and beginning the withdrawal diet		
		3 days and less	More than 3 days	Total
Nicarbazin Residue greater than LOD	Positive	17.2% (5)	16.2% (36)	16.3% (41)
	Negative	82.8% (24)	83.8% (186)	83.7% (210)
	Total	100% (29)	100% (222)	100% (251)

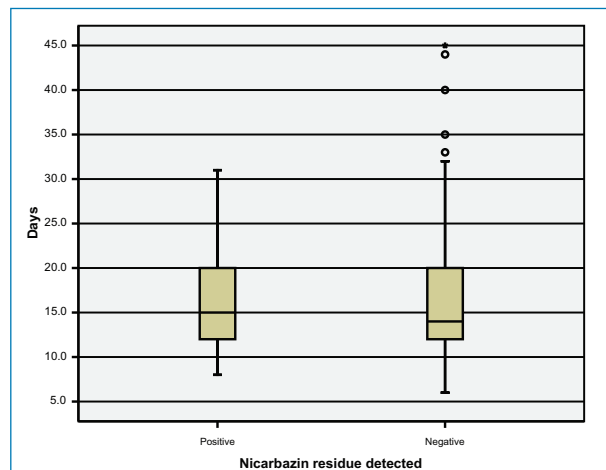
No significant differences exists when comparing those that gave 3 days and less between Nicarbazin and withdrawal diet and those with more than 3 days.

Derived results: Days between when finished feeding Nicarbazin and slaughter.

Overall	
Count	252
Minimum	6.0
Percentile 25	12.0
Median	14.0
Percentile 75	20.0
Maximum	45.0
Mean	16.6
Std Deviation	6.6



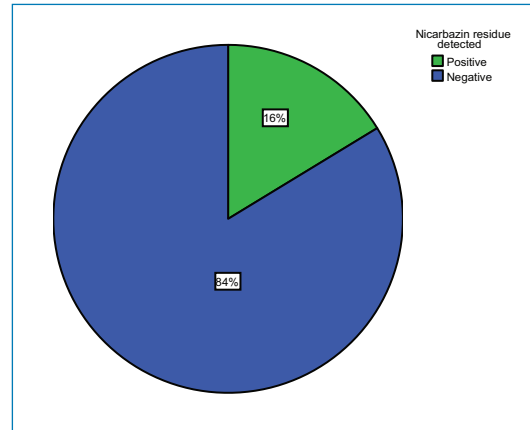
Positive	
Count	41
Minimum	8.0
Percentile 25	12.0
Median	15.0
Percentile 75	20.5
Maximum	31.0
Mean	16.8
Std Deviation	6.2



Negative	
Count	211
Minimum	6.0
Percentile 25	12.0
Median	14.0
Percentile 75	20.0
Maximum	45.0
Mean	16.5
Std Deviation	6.7

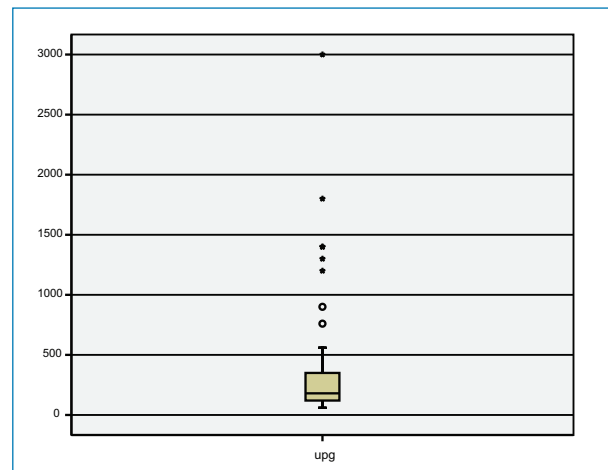
Final Screening results – residue above level of detection:

	Frequency	Percent
Positive	41	16%
Negative	211	84%
Total	252	100 %



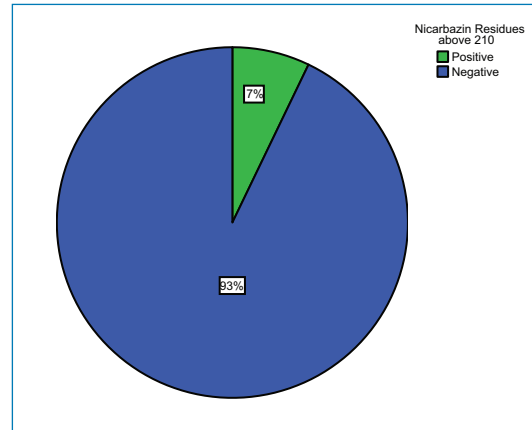
Positive Screening results – above level of detection:

Count	41
Minimum	60
Percentile 25	120
Median	180
Percentile 75	445
Maximum	3000
Mean	442
Std Deviation	599



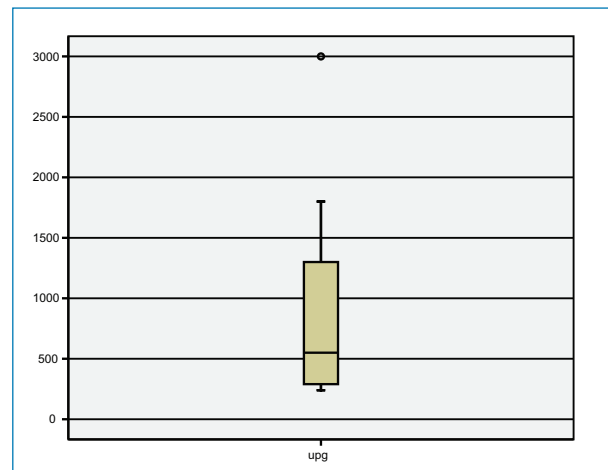
Final Screening results – residue above 200:

	Frequency	Percent
Positive	18	7%
Negative	234	93%
Total	252	%



Positive Screening results – above 200:

Count	18
Minimum	240
Percentile 25	288
Median	550
Percentile 75	1325
Maximum	3000
Mean	842
Std Deviation	736



Nicarbazine Report references

CANNAVAN, A., BALL, G., KENNEDY, G..

Nicarbazine Contamination in feeds as a cause of residues in eggs.

Food Additives and Contaminants 17 (10) : 829-836

CANNAVAN, A., KENNEDY, G..

Possible causes of nicarbazine residues in tissues

Food Additives and Contaminants 17 (12) : 1001-1006

DANAHER, M., CAMPBELL, K., O'KEEFFE, M., CAPURRO, E., KENNEDY, G., ELLIOTT, C..

Survey of the anticoccidial feed additives nicarbazine (as dinitrocarbanilide residues) in poultry and eggs.

Food Additives and Contaminants 25 (1) : 32-40

McEVOY, J.D.G., SMYTH, W.G., KENNEDY, G....

Contamination of animal feedingstuffs with nicarbazine : investigations in a feed mill

Food Additives and Contaminants 20 (2) : 136-140

O'KEEFFE, M., CAPURRO, E., DANAHER, M., CAMPBELL, K., ELLIOTT, C.T.. Investigation of the causes for the occurrence of residues of the anticoccidial feed additive nicarbazine in commercial poultry.

Food Additives and Contaminants 24 (9) : 923-934

© Crown copyright
Published by Food Standards Agency
May 2008
FSA/1261/0508