A case of salinomycin intoxication in turkeys

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Abstract — A flock of 4287 heavy hybrid turkey hens were accidentally fed broiler premix containing salinomycin sodium and suffered a 34.5% death loss. Measures taken to ensure food safety for the remaining flock and consumer food safety included feed record studies, on-farm veterinary consultation, diagnostic laboratory studies, and CgFARAD and CFIA consultation. The remaining turkeys were processed 3 weeks after the initial toxicosis with no evidence of lesions that would render the product unfit for human consumption.

Résumé — Un cas d’intoxication causé par la salinomycine chez les dindons. Un troupeau de 4287 dindons hybrides lourds a été nourri accidentellement avec un prémélange pour poulets à griller contenant de la salinomycine sodique et 34,5 % des animaux sont morts. Les mesures prises afin d’assurer l’innocuité des aliments pour le reste du troupeau et la salubrité des aliments de consommation ont comporté des études sur la consignation des aliments, des consultations à la ferme par un vétérinaire, des études par des laboratoires de diagnostic et une consultation avec le CgFARAD et l’ACIA. Les autres dindons ont été transformés trois semaines après la toxicose initiale sans preuve de lésions qui rendraient le produit inapte à la consommation humaine.

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Fourteen hundred and seventy-eight of 4287 (34.5%) heavy hybrid turkey hens in a flock in Manitoba died during a 9-day period from May 30 to June 8, 2004. Forty-four day-old turkey poults were purchased from a hatchery in Manitoba on February 24, 2004. From then until May 30th, the total death rate had been 2.57%. On May 29, a new 2 tonne batch of on-farm manufactured feed that mistakenly contained a broiler premix used for a chicken production unit located on the same farm was fed to the turkeys. The feed contained 60 ppm of salinomycin sodium (Sacox 120; Intervet, Whitby, Ontario) and 50 ppm of bacitracin methylene disalicylate (BMD) (BMD 110 G; Alpharma, Mississauga, Ontario).

On the 31st of May, the producer treated the birds with penicillin G potassium U.S.P. soluble powder (Pot-Pen; A.P.A., Rhone-Merieux, Montreal, Quebec) and electrolytes, since an infectious disease was suspected to be the cause of the deaths. These treatments were discontinued on June 2nd, when the feeding error was detected. The contaminated feed was cleaned out, so the last possible exposure to the contaminated feed was on the morning of June 2nd. The turkey producer called his veterinarian who investigated the incident on June 3rd. The veterinarian found dead birds, and birds with signs of dyspnea, drowsiness, sternal recumbency with legs extended posteriorly, inability to stand, stiffness, and weakness (more than 60% of the total deaths had occurred by this time).

Live and newly dead turkeys were submitted to the diagnostic laboratory at the Veterinary Services Branch of Manitoba Agriculture and Food for bacteriologic, histologic, and toxicologic studies. A history of the contaminated feed was included with the submissions. The pathologist reported that the birds were in good body condition with no significant findings on gross necropsy or bacteriologic study. Spleens were small and there was no evidence of pneumonia or air sacculitis. Histological study revealed very extensive fragmentation and necrosis of muscle fibers in most sections. Myocardial fibers were eosinophilic and undergoing fragmentation. No other lesions were found. Given the history of salinomycin-contaminated feed and the histological signs, some birds were held for future studies, but it was deemed unnecessary to continue with toxicological studies.

The Canadian global Food Animal Residue Avoidance Database (CgFARAD) was consulted for information on residue levels of salinomycin and BMD in the remaining live birds. Salinomycin is used legally (medicated ingredients brochure [MIB #69]) for the prevention of coccidiosis caused by Eimeria acervulina, E. mitis, E. necatrix, E. maxima, E. tenella, and E. brunetti in broiler chickens at a level of 60 ppm (1). Salinomycin is also used, on-label, for improved feed efficiency in steers and for improved growth rate, feed efficiency, and as an aid in suppression of estrus in heifers being fed for slaughter. Salinomycin is compatible with bambermycins, lincomycin, virginiamycin, BMD, and melengestrol.
acetate within the same diet (1). According to the United States Pharmacopeia (USP) ionophore monograph (2), the label dose of 60 ppm of salinomycin in broiler feed and a zero day withdrawal period result in tissue concentrations of salinomycin and its metabolites in breast and thigh muscle of < 0.005 ppm. According to the US New Animal Drug Applications (NADA) 128–686 (3), the safe concentrations for total salinomycin residues in uncooked edible tissues of broiler chickens were established at 0.6 ppm in muscle, 1.8 ppm in liver, and 1.2 ppm in skin and fat (2). Salinomycin is detectable at concentrations of 0.0015 ppm in edible turkey tissues. The safety tolerance level of salinomycin in edible turkey tissues is 0.5 ppm (2). The expected period between the last possible exposure to the contaminated feed and the slaughter date was 12 d and this was deemed to be more than adequate to ensure that there would be no human health concern and that salinomycin residues would not be detected at slaughter by the Canadian Food Inspection Agency (CFIA).

The Compendium of Medical Ingredient Brochures (CMIB) has a label claim (MIB #10.2) for bacitracin (zinc or methylene disalicylate) for use in chickens, turkeys, and swine, as an aid to improving weight gain and feed efficiency. This claim allows its use in turkeys at 4.4 ppm of complete feed, with a zero day withdrawal time. The affected turkeys in this case had 50 ppm of BMD in complete feed. The CMIB also has label claims (MIB #48) for BMD use in broiler chickens and pregnant and lactating sows and gilts. The claims for broilers include a claim for using 110 ppm in complete feed for reducing early mortality in broilers due to diminished feed consumption and chilling, with a zero day withdrawal time. The other claim is for using 55 ppm in complete feed for prevention of necrotic enteritis in broiler chickens caused by Clostridium perfringens susceptible to bacitracin, with a zero day withdrawal time.

However, the US Food and Drug Administration (USFDA) has label clearances for the use of 200 ppm of BMD in complete feed in growing turkeys as an aid in the control of transmissible enteritis complicated by organisms susceptible to BMD, with a zero day withdrawal time. The manufacturer of a BMD product, (BMD50; Alpharma, Fort Lee, New Jersey, USA, equivalent to the Canadian BMD 110 G) claims that it is not absorbed from the intestinal tract and that no detectable tissue residues develop. Given this FDA clearance, it was decided that the only risk was that of salinomycin residue.

Because a CgFARAD withdrawal recommendation is not an official withdrawal time and is based on data that has not been reviewed or approved by Health Canada’s Veterinary Drugs Directorate, responsibility for residue violations rests with the prescribing veterinarian (4). The expert-mediated advice on any inquiry related to drug or chemical residues in food animals retains its value because recommendations are made based on the best scientific evidence available, should problems arise. In this case, consultation with the CFIA was made as well. Given the data previously described, the CFIA approved the suggested slaughter date.

Due to scheduling issues, the actual slaughter date was June 21, when 2809 birds, weighing an average of 9.36 kg, were processed. Five were condemned for reasons unknown, 2406 were graded ‘A’ and 398 were graded ‘under A’. Canadian heavy turkey hens are marketed between 7 and 9 kg; therefore, some of the ‘under A’ may have been caused by over-weight birds. Financial losses were estimated to be $22 000 based on market value of the birds lost. Additional feed required for the remaining birds, veterinary services and laboratory tests, additional fixed costs (heating, light, etc.), and grade depreciation costs were not calculated.

Salinomycin toxicity in turkeys has been reported on numerous occasions (5–10). Different causes of these feeding mistakes have been discussed (9), toxicity levels evaluated (5,10), and pathological effects studied (6,8,9). However, the process for ensuring a safe food product after exposure to salinomycin has not previously been described. There is a consumer-driven demand for safe food products, which can best be ensured if the quality assurance programs are producer-driven. Producers who realize that food safety is vital to maintaining both domestic and foreign markets are best suited to drive food safety programs to higher quality levels. Veterinarians play a key role in providing producers with professional advice concerning these programs: how to implement them and how to cross check to ensure that unsafe food products do not enter the food chain.

In 1993, the Canadian Turkey Marketing Agency (CTMA) published its Best Management Practices for Turkey Production. This program currently serves to inform turkey producers about pathogen control, among other things. However, the CTMA is currently developing an HACCP (Hazard Analysis Critical Control Points), based Bio-Security and Quality Assurance Program for farm use. The program should ensure that a safe product is produced more consistently.

This case highlights the effectiveness of the current Canadian food safety programs. Accurate on-farm animal feed and medication records helped the producer to assess which birds were affected and for how long. The CgFARAD database provided science-based evidence that the food product was safe, given the withdrawal period. The CFIA gave prompt approval of the slaughter date. However, there are issues that still need to be addressed. There is a need for veterinarians to have a more complete knowledge about which pharmaceuticals are producer-driven. Producers who realize that food safety is vital to maintaining both domestic and foreign markets are best suited to drive food safety programs to higher quality levels. Veterinarians play a key role in providing producers with professional advice concerning these programs: how to implement them and how to cross check to ensure that unsafe food products do not enter the food chain.

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