

Poultry abattoir survey of carcass condemnation for standard, vegetarian, and free range chickens

Drago Herenda, Oliver Jakel

Abstract

During the period April 1991 to March 1992, data concerning the condemnation rate of standard, vegetarian, and free-range chickens were collected and summarized from one federally inspected abattoir in Ontario. The purpose of this study was to discuss the effects of diet, management, and breed of chickens on pathological lesions, ensuing condemnation rates, and consequent losses to the growers and the poultry industry.

The data collected at this abattoir revealed that vegetarian chickens showed a higher condemnation rate (5.23%) for disease and nondisease conditions compared with standard (1.48%) and free-range (0.94%) chickens. Free-range chickens were approximately two weeks older than vegetarian and standard chickens at the time of slaughter. The most common causes of condemnation in vegetarian chickens was cellulitis (1.18%), followed by ascites (0.77%). Ascites and cellulitis (0.26% both) were also the most common causes of condemnation in standard chickens. Cyanosis (0.21%) and mutilation (0.17%) represented the highest rate of condemnation in free-range chickens. The low rate of pathological lesions in free-range chickens is a positive trend in poultry disease management.

Résumé

Enquête sur les causes de retrait des carcasses de poulet à l'abattoir pour les catégories suivantes: régulier, végétarien et élevé sur parquet

Cette étude regroupe les données d'un abattoir sur les taux de retrait des carcasses de poulet de catégories régulier, végétarien et élevé sur parquet pour la période d'avril 1991 à mars 1992.

Le but de cette étude était de discuter des effets de la diète, de la régie et de la catégorie de poulets sur les lésions pathologiques responsables du retrait de la carcasse, et par conséquent, des pertes pour l'éleveur et l'industrie.

Les données compilées provenant de l'abattoir montrent que les poulets de catégorie végétariens ont un plus haut taux de retrait (5.23 %) pour des raisons pathologiques et non pathologiques, comparativement aux poulets de catégories réguliers (1.48 %) et élevés sur parquet (0.94 %). Les poulets de catégorie élevés sur parquet étaient approximativement âgés de deux semaines de plus lors de l'abattage comparativement aux poulets de catégorie végétariens et réguliers. La cellulite était la raison la plus fréquente de retrait pour le groupe

végétarien suivi de l'ascite (0.77 %). L'ascite et la cellulite (0.26 % combiné) étaient aussi les causes les plus fréquentes de retrait pour les poulets de catégorie réguliers. La cyanose (0.21 %) et la mutilation (0.17 %) représentaient le plus haut taux de retrait pour les poulets de catégorie élevés sur parquet. Le faible taux de lésions pathologiques chez les poulets de catégorie élevés sur parquet représente une tendance positive dans la régie des maladies de la volaille.

(Traduit par Dr Thérèse Lanthier)

Can Vet J 1994; 293-296

Introduction

Standard chickens are commercial broilers fed conventional diets, which may include growth promotants, antibiotics, and anticoccidials. They are slaughtered at six to eight weeks of age.

Vegetarian chickens (also called organic or green chickens) are commercial broilers fed a 100% vegetable diet without animal fat or feed additives, such as synthetic growth promotants, antifungal agents, antibiotics, or antioxidants. They are likewise slaughtered at six to eight weeks of age.

Free-range chickens (also called label rouge gourmet chickens or champagne poulet) are a special breed of chicken, developed in France by crossing two breeds JAS7 (female) and 199 (male). They are raised on range and fed an all vegetable diet without any fat derivatives or antibiotics (1-3).

Monitoring disease and other conditions at slaughter has been recognized as one mode of assessing the disease status of a herd or flock (4-7).

This study was conducted with two objectives:

- to compare condemnation rates and reasons for condemnation of standard, vegetarian, and free-range chickens in one poultry abattoir.
- to compare gross lesions with laboratory findings in selected representative cases.

Materials and methods

The standard and vegetarian chickens originated from producers in southern Ontario. The free-range chickens were imported from the southern United States. The stocking density for vegetarian chickens was 1 sq ft per bird and for standard chickens 0.7 sq ft per bird, depending on quota and barn rotation. The vegetarian chickens were raised on a dedicated farm consisting of 12 pens and continuous cropping. Free-range chickens were kept in small flocks of 4000-5000 birds on a minimum of two acres of range pasture.

All chickens were stunned using electrical stunners. They were then scalded, plucked, and eviscerated, prior to air chilling. Carcasses of free-range chickens were air chilled and aged for a minimum of 12 h at 0°C-2°C to

Agriculture and Agri-Food Canada, 70 Glen Scarlett Rd., Toronto, Ontario M6N 1P4 (Herenda); 1147 Gordon Street, Guelph, Ontario N1H 6H9 (Jakel).

Table 1. Major causes of condemnation in standard, vegetarian, and free-range chickens examined during the period April 1, 1991 to March 31, 1992

Disease conditions	Standard		Vegetarian		Free-range	
	number	(%)	number	(%)	number	(%)
Ascites	26,003	(0.26)	2,721	(0.77)	113	(0.05)
Cellulitis	25,500	(0.26)	4,201	(1.18)	109	(0.05)
CRD ^a	7,209	(0.07)	3,037	(0.85)	39	(0.02)
Dermatitis	2,009	(0.02)	313	(0.09)	147	(0.06)
Emaciation	21,235	(0.22)	2,248	(0.63)	331	(0.15)
Hepatitis	7,470	(0.08)	854	(0.24)	34	(0.01)
Pendulous crop	1,546	(0.02)	130	(0.04)	13	(0.01)
Salpingitis	386	(0.00)	334	(0.09)	7	(0.00)
Synovitis	40	(0.00)	29	(0.01)	2	(0.00)
SCC ^b	199	(0.00)	41	(0.01)	0	(0.00)
VVD ^c	8,695	(0.09)	757	(0.21)	140	(0.06)
Peritonitis	77	(0.00)	0	(0.00)	2	(0.00)
Total disease condemnations	100,369	(1.02)	14,665	(4.13)	935	(0.41)
Nondisease conditions						
Bruises	11,780	(0.12)	770	(0.22)	154	(0.07)
Contamination	4,687	(0.05)	365	(0.10)	121	(0.05)
Inadequate bleeding	3,113	(0.03)	292	(0.08)	45	(0.02)
Cyanosis	17,589	(0.18)	1,843	(0.52)	468	(0.21)
Mutilation	8,031	(0.08)	523	(0.15)	390	(0.17)
Overscald	176	(0.00)	120	(0.03)	0	(0.00)
Total nondisease condemnations	45,376	(0.46)	3,913	(1.10)	1,178	(0.52)
Total all conditions	145,745	(1.48)	18,578	(5.23)	2,115	(0.94)
Total DOA^d	50,797	(0.52)	2,383	(0.67)	542	(0.24)
Total slaughtered	9,829,296		355,264		225,317	

^a Chronic respiratory disease

^b Squamous cell carcinoma

^c Valgus varus deformity

^d Dead on arrival

achieve tenderness and enhanced flavor. Standard chickens were slaughtered at an average line speed of 72 birds per minute, or 175,000 birds per week.

The live plant weight of standard chickens was 2.0 kg, and the yield was 62%–64%. Vegetarian chickens had a live plant weight of approximately 1.8 kg–2.4 kg and a yield of approximately 62%–64%. The weight varied because male chickens are raised for six weeks and female chickens for seven weeks. The live plant weight of free-range chickens was approximately 2.3 kg–2.5 kg, with a yield of 63%–64%.

All carcasses were inspected by Agriculture Canada employees. Antemortem examinations were done when birds were in crates, and after they had been hung in shackles in the receiving room. Diseased birds were segregated for a thorough examination. Internal inspections of carcasses and viscera and external inspection of the eviscerated carcasses were performed on post-mortem examination. For internal inspection, the poultry carcasses were hung by the legs (suspended at two points system). All viscera including intestine, liver, spleen, and heart were visually examined and palpated. Visual examination of the inside of the carcasses for pathological conditions was also carried out. Two veterinarians performed postmortem judgements on any diseased or abnormal carcasses screened out from the evisceration line. They determined if carcasses were fit for human consumption, and if not, they determined

the reason for condemnation. If more than one condition was found in carcasses, agreement was reached between two veterinarians on assessing the primary lesion that caused carcass condemnation. For the purpose of this study, the conditions observed that resulted in carcass condemnation were separated into disease conditions that occurred on the farm and nondisease conditions that occurred after the birds left the farm. Histological and bacteriological examinations were performed at the Animal Diseases Research Institute, Nepean, Ontario, on four carcasses affected with cellulitis, six liver specimens, and three carcasses affected with chronic respiratory disease, in order to confirm diagnoses.

Data for standard, vegetarian, and free-range chickens during the twelve-month period, April 1, 1991, to March 31, 1992, were collected for each lot. They consisted of the total number condemned and number of those condemned for specific conditions.

Results

During the study period, 9,829,296 standard chickens, 355,264 vegetarian chickens, and 225,317 free-range chickens were slaughtered. Standard and vegetarian chickens originated from a variety of genetic crosses, including Avian, Peterson, Hubbard, and Ross.

The overall condemnation rates are given in Table 1. Statistics regarding seasonal slaughter and condemnation rates are given in Table 2. Similarly, seasonal

Table 2. Seasonal slaughter and condemnation rates for standard, vegetarian, and free-range chickens slaughtered during the period April 1, 1991 to March 31, 1992

	Number slaughtered (% condemned)					
	Standard		Vegetarian		Free-range	
April-June	2,225,052	(1.10)	91,362	(2.51)	32,517	(0.63)
July-September	2,227,769	(1.13)	81,083	(6.38)	73,886	(0.50)
October-December	2,367,731	(1.60)	93,924	(5.49)	51,857	(1.41)
January-March	3,008,744	(1.93)	88,895	(6.63)	67,057	(1.21)

Table 3. Seasonal dead on arrival numbers and rates for standard, vegetarian, and free-range chicken slaughtered during the period April 1, 1991 to March 31, 1992

	Number slaughtered (% condemned)					
	Standard		Vegetarian		Free-range	
April-June	12,099	(0.54)	613	(0.67)	19	(0.06)
July-September	9,566	(0.43)	579	(0.71)	279	(0.38)
October-December	10,436	(1.60)	586	(5.49)	80	(1.41)
January-March	18,588	(1.93)	605	(6.63)	164	(1.21)

statistics regarding chickens found dead on arrival are shown in Table 3.

Pure cultures of *Escherichia coli* were isolated from three carcasses affected with cellulitis, while a mixed growth of *E. coli* and staphylococci was isolated from a fourth.

Hepatitis was confirmed on histological examination of the six liver specimens, and on bacteriological examination, one specimen yielded a light, mixed growth of *Pseudomonas putida* and *Enterobacter* sp. Two other specimens, which were enlarged and pale, yielded a growth of *Clostridium perfringens*.

The three submissions exhibiting chronic respiratory disease (CRD) were examined histologically and bacteriologically and confirmed as having airsacculitis, pericarditis, and perihepatitis. *Escherichia coli* was isolated from all three specimens.

Discussion

Diet, breed, and management of poultry may be associated with the presence or absence of pathological lesions. Notable differences in overall condemnation rates were observed among vegetarian, standard, and free-range chickens. There was considerable difference in the condemnation percentage for diseased conditions in vegetarian chickens (4.13%) compared to standard (1.02%) and free-range chickens (0.41%). The presence of antibiotics in the feed of standard chickens may be responsible for their markedly lower rate of condemnation compared to that of vegetarian chickens of the same age. The last six annual reports on chemical and biological testing of agri-food commodities by Agriculture Canada (8) have shown that random and suspect chicken samples across Canada have tested negative for antibiotic residues. This raises the question of whether there is justification for the higher price for vegetarian chickens labelled as "antibiotic-free chicken" at the market, when standard chickens are also free of antibiotics (9). Although there was a high

rate of condemnation of vegetarian chickens during the study period, the overall operation was still considered viable. The total costs and profits to the producer and the abattoir and the possible health benefits to the consumer of raising and marketing vegetarian chickens should be carefully weighed and assessed.

The low prevalence of disease conditions in free-range chickens is a positive trend in poultry disease management; it will require further studies to elucidate factors that may be responsible. It is likely that the higher rate of carcass mutilation in free-range chickens is associated with breed characteristics. These chickens have a long, lean breast; a deep abdominal cavity; and both sexes were affected. With the use of modified equipment, a slower line speed, and possibly hand evisceration, the problem of mutilation could probably have been eliminated in these chickens.

The condemnation rate for standard chickens observed in this study was one percent lower than the Canadian mean annual rate (2.489%) reported during the years 1987-1989. This may reflect a difference in the health status of the primary stock available for slaughter at this particular establishment.

Many of the birds that were condemned for disease conditions were also emaciated and could have been culled at the farm. The producer incurred expenses for feeding and housing these diseased chickens. Moreover, producers are charged on the basis of multiplying the number of condemned birds by the average live bird weight on arrival at the plant; hence, an even greater loss to the producer occurs, since the condemned birds are normally much lighter than the average bird.

CVI

Acknowledgments

We thank Drs. T. Feltmate and J.R. Bisailon, Agri-Food Safety and Strategies Division, Agriculture and Agri-Food Canada, for their advice in the preparation of this manuscript, and Supervising Inspector Gord Bishop

for assistance in the collection of data. The service of the histopathology and bacteriology sections of the Animal Diseases Research Institute, Nepean, are also acknowledged.

References

- (Anonymous). Label Rouge gaining popularity outside France (editorial). *Poultry Int* 1981; 29: 66-68.
- King R. Producing Label Rouge poultry in France (editorial). *Poultry Int* 1987; 26: 12-16.
- The French produce three types of meat chicken (editorial). *Poultry Int* 1983; 22: 68.
- Ansong-Danquah J. A survey of carcass condemnation at a poultry abattoir and its application to disease management. *Can Vet J* 1987; 28: 53-56.
- Feltmate TE. The modern role of meat inspection of food hygiene. *Can Vet J* 1985; 26: 29-33.
- Goodhand R. The future role of meat inspection in the field of meat hygiene. *The Meat Hygienist* 1983; 38: 4-8.
- National Research Council. Meat and poultry inspection; the scientific bases of the nation's program. Washington, DC: National Academy Press, 1985.
- Agriculture and Agri-Food Canada annual report (1991-92) on chemical and biological testing of agri-food commodities. Published by Agri-Food Safety and Strategies Division, Food Inspection Directorate, Food Production and Inspection Branch, Agriculture and Agri-Food Canada. Available from Agri-Food Safety and Strategies Division, 2255 Carling Avenue, Ottawa, Ontario K1A 0Y9.
- Leeson S. The need for growth promoting compounds in poultry meat production. *J Agric Environ Ethics* 1991; 4: 89-99.

Answers to Quiz Corner/Les réponses du Test Éclair

- d — Hexachlorophene forms a bacteriostatic film on the skin if used exclusively to wash the hands and arms. Other soaps remove the protective film.
d — L'hexachlorophène forme un film bactériostatique sur la peau s'il est employé exclusivement pour le lavage des mains et des bras. Les autres savons enlèvent le film protecteur.
- a — There is no known means of testing cats to see if they are carriers of the cat scratch organism. The ability of a cat to transmit the disease appears to be transient, which makes isolation or euthanasia impractical and unnecessary.
a — Il n'y a pas de tests connus pour voir si les chats sont porteurs de l'organisme qui cause la maladie des griffures du chat. La capacité d'un chat à transmettre la maladie semble être transitoire, ce qui rend l'isolement ou l'euthanasie irréalisable et inutile.
- a — Orf is a contagious poxvirus infection of goats and sheep that most commonly affects young animals. This disease is a zoonosis and is prevented by yearly vaccination.
a — L'ecthyma contagieux est une infection à poxvirus des chèvres et des moutons qui affecte le plus fréquemment les jeunes animaux. La maladie est une zoonose et est prévenue par une vaccination annuelle.
- b — Diarrhea due to rotavirus infection usually occurs in calves one to two weeks of age.
b — La diarrhée due à la rotavirose se produit habituellement chez des veaux âgés de une à deux semaines.
- a — *Rhodococcus equi* is an intracellular organism. Erythromycin and rifampin achieve high levels intracellularly.
a — *Rhodococcus equi* est un organisme intracellulaire. L'érythromycine et la rifampicine atteignent de fortes concentrations intracellulaires.
- c — Trichomoniasis usually causes early embryonic loss and varying periods of infertility.
c — La trichomoniose cause habituellement une perte embryonnaire précoce et des périodes variables d'infertilité.
- a — Euthanize the raccoon and submit the carcass to a laboratory for rabies testing. The 10-day observation period is only used for dogs and cats.
a — Il faut faire l'euthanasie du raton laveur et soumettre la carcasse à un laboratoire pour le dépistage de la rage. La période d'observation de 10 jours est utilisée uniquement pour les chiens et les chats.
- a — The other items listed are used to treat encephalopathy (lactulose, neomycin, low-protein diet) or help control ascites (low-salt diet). Dexamethasone may exacerbate bacterial cholangitis or may further diminish hepatic function due to vacuolar hepatopathy.
a — Les autres moyens énumérés sont utilisés pour traiter l'encéphalopathie (lactulose, néomycine, diète faible en protéines) ou aider au contrôle de l'ascite (diète à faible teneur en sel). La dexaméthazone peut exacerber la cholangite bactérienne ou peut diminuer davantage la fonction hépatique due à l'hépatopathie vacuolaire.
- b — Enamel hypoplasia suggests preceding distemper infection. Inclusion bodies are rarely seen. Lymphopenia is nonspecific. Central nervous system signs may occur now, later, much later, or never.
b — L'hypoplasie de l'émail suggère une infection antérieure du distemper. Les corps d'inclusion sont rarement observés. La lymphopénie n'est pas spécifique. Les atteintes du système nerveux central peuvent se produire maintenant, plus tard, beaucoup plus tard ou jamais.
- b