

# A retrospective study on the prevalence of ostrich carcass and organ condemnations in Botswana

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**Abstract** A retrospective study on the prevalence of ostrich carcass and organ condemnations in Botswana was conducted by reviewing meat inspection records available at the Botswana Ostrich Company Abattoir in Gaborone for the 3 year period that the abattoir had been in operation. The most frequently condemned organs were lung (85.1%), liver (8%), intestine (3.3%), heart (2.7%) and kidney (0.8%). The most frequently encountered macroscopic findings were contamination (80%), congestion (10%), enteritis (3%), haemorrhage (2%), pigmentation (2%), white spots on the liver (1%) and peritonitis (1%). The frequencies of the various macroscopic findings on all the organs increased over the 3 years of the study. Ninety-five percent (95%) of the findings were all abattoir associated, especially the external contamination of organs (80%). The 5% that were acquired during the lifetime of the birds included enteritis, peritonitis and white spots on the liver. No whole carcass condemnations or carcass trimmings were

recorded, nor where there any zoonotic causes of condemnation.

**Keywords** Ostrich · Abattoir records · Condemnations · Findings · Prevalence

## Introduction

Livestock diseases and condemnation rates at slaughter can give a useful guide to the incidence of the less acute, chronic, mild and sub clinical diseases which occur in production animals in regions served by various abattoirs (Chambers 1987; Mallia et al. 2000). Therefore, data gathered on animals slaughtered at an abattoir can be a convenient and inexpensive source of information (Roberts and Suhardono 1996). The authors further stated that the data could be used to determine trends in prevalence and significance of the disease(s) especially where the reporting system is reliable.

Studies have shown a poor correlation between ante mortem and postmortem examination results with regards to lesions (Green et al. 1997), further emphasizing the importance of data collected at meat inspection and/or postmortem examination of carcasses. Previous abattoir studies have also shown a significant economic loss owing to carcass and organ condemnations (Pfukenyi and Mukaratirwa 2004; Vassilev and Jooster 1991). Information gathered from abattoir records can be used by farmers to

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improve the husbandry of their animals (Edwards et al. 1999), and probably avoid some losses related to preventable diseases. To date, no records exist on condemnation data of the ostrich at slaughter. Such records do exist for chickens, cattle and other animals (Vassilev and Jooster 1991; Bergmann et al. 1995; Bisailon et al. 1988; Herenda and Jackel 1994; Jacob et al. 1998; Pfukenyi and Mukaratirwa 2004).

In Botswana, ostrich producers send their birds for slaughter to a central abattoir that is located in Gaborone and owned by the Botswana Ostrich Company. This facility was established in 2001, and started exporting to the European Market in August 2004. State meat inspectors routinely inspect the slaughtered birds and state veterinary public health officers supervise the inspection of the carcasses. The inspection is done independently of the abattoir owners, and hence they do not have any influence on the inspection.

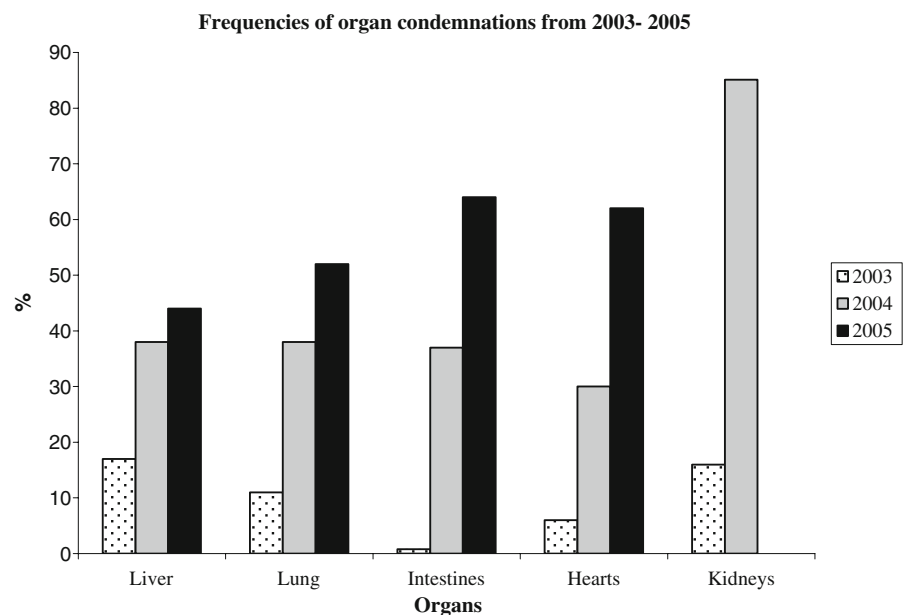
To the best of our knowledge, no work has been done on the causes and prevalence of ostrich carcass and organ condemnations based on abattoir records. The objectives of this study were therefore to determine the prevalence of ostrich carcass and organ condemnations at slaughter, and briefly describe the primary findings that led to these condemnations,

based on records of the only ostrich abattoir in Botswana during the period of 2003 to 2005.

## Materials and methods

Meat inspection records available at the single ostrich abattoir in Gaborone, Botswana were reviewed for the 3-year period from 2003 to 2005. This represented the period for which records could be accessed. At the abattoir, post-mortem inspections were carried out in line with FAO general principles on ante-mortem and post-mortem inspection of food animals ([www.fao.org/docrep/003/t0756e/T0756E01.htm](http://www.fao.org/docrep/003/t0756e/T0756E01.htm)). In this study, data from annual returns were analysed for the organs and carcasses that were condemned. Prevalence rates were computed by expressing the total number of times that a particular organ was condemned as a percentage of the total number of organ condemnations over the study period. This was after Pfukenyi and Mukaratirwa (2004). The year on year condemnation rates for specific organs were computed as the number of times that the particular organ was condemned in that year expressed as a percentage of the total number of times the organ was condemned over the study period.

**Fig. 1** Frequencies of organ condemnations from 2003–2005



**Table 1** Summary of organs that were condemned during meat inspection (n=949)

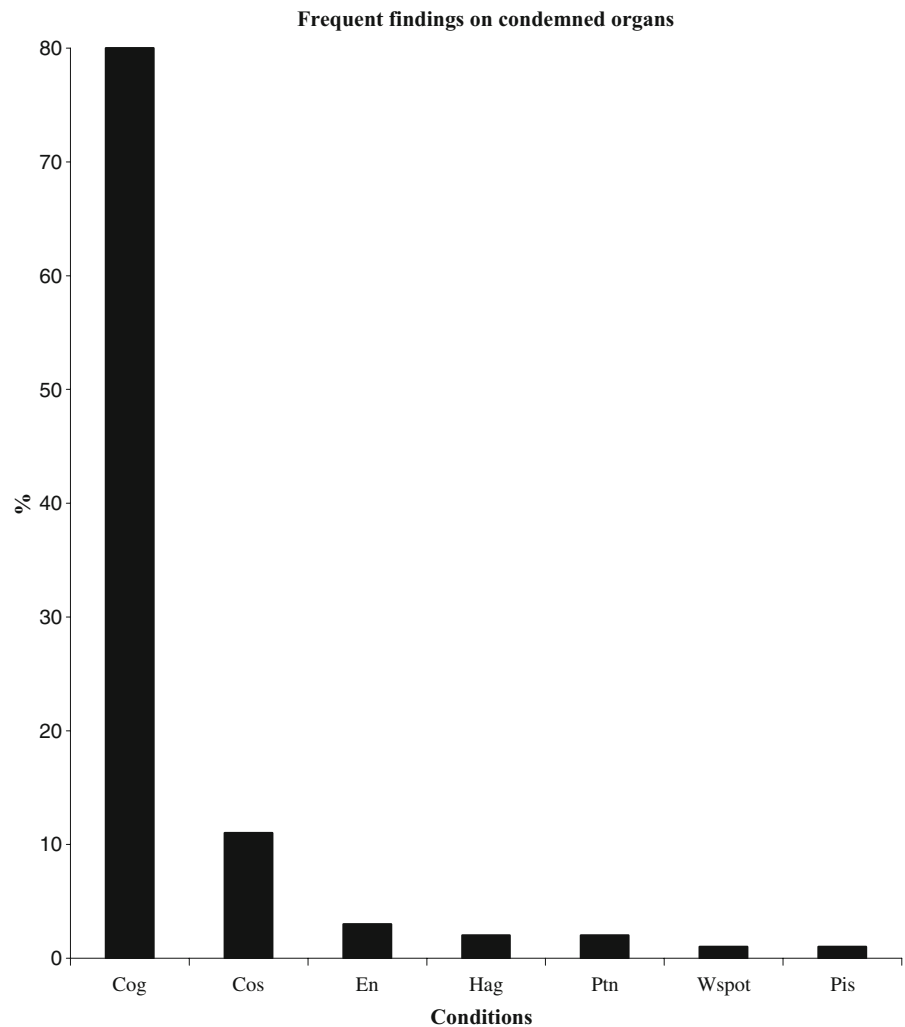
Organ	% of total condemnations
Lung	85.1
Liver	8.0
Intestine	3.3
Heart	2.8
Kidney	0.8

## Results

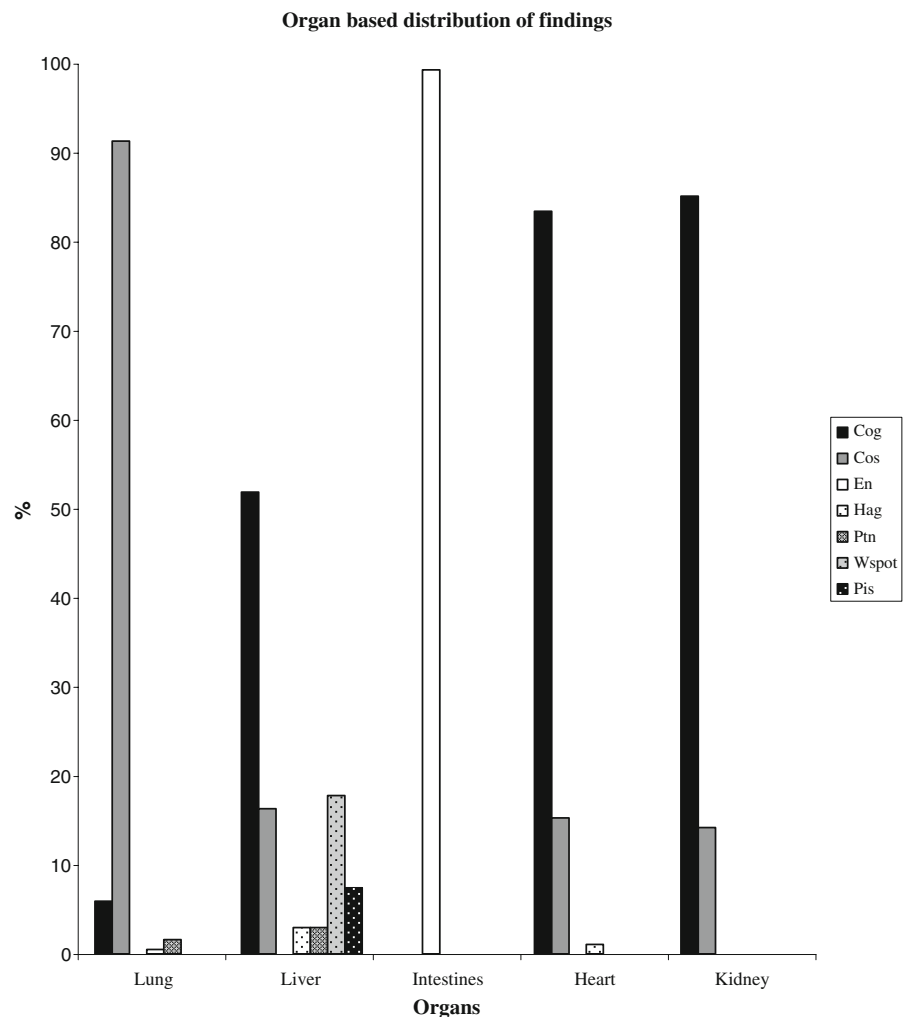
A total of 3 814 ostriches were slaughtered over the study period. From these, a total of 949 organs were condemned for various reasons. The most frequently condemned organs were the lung, liver, intestines,

heart and kidney (Fig. 1) at varying frequencies ranging from 0.8–85.1% of the total number of condemned organs (Table 1). The condemnation frequencies of the different organs increased over the 3 years (Fig. 1). The most frequent findings associated with organ condemnations were congestion (11%), enteritis (3%), haemorrhage (2%), pigmentation (2%), white spots on the liver (1%), and peritonitis (1%) (Fig. 2), and the frequencies differed from organ to organ (Fig. 3). However, ninety-five percent (95%) of the sources of organ condemnations were all abattoir associated, especially the external contamination (80%) that mainly involved the lung. Noteworthy were the absence of condemnation macroscopic findings of a zoonotic nature, or whole carcass or meat cut condemnations.

**Fig. 2** Frequent findings among condemned organs (n=949). Key: Cog- contamination, Cos- congestion, En- enteritis, Hag- haemorrhage, Ptn- pigmentation, Wspot- white spots on liver, Pis- peritonitis



**Fig. 3** An organ-based distribution of frequent findings on condemned organs (n=949). Key: Cog- contamination, Cos- congestion, En- enteritis, Hag- haemorrhage, Ptn- pigmentation, Wspot- white spots on liver, Pis- peritonitis



## Discussion

The duration of the study period was influenced by the duration of time over which the abattoir had been in operation. The most frequent finding, contamination, was abattoir associated, pointing to the need for a constant review of abattoir processes and procedures in order to avoid such condemnations. Contamination is the adulteration of organs with grease, gall, faecal matter (extensive), or other noxious material that renders them unfit for human consumption. The contaminated part(s) can be trimmed off, provided the remainder does not retain odors or unsound characteristics. Where the contamination is so generalised as to make removal impractical, total condemnation would be required.

The absence of whole carcass condemnations also appears to be in agreement with the above discussion on abattoir procedures, since findings associated with whole carcass condemnations are usually consistent with processes that occur during the life of the bird.

Enteritis and peritonitis were the obvious farm level causes of condemnation since they involve inflammatory reactions, which can only occur during the life of the birds. This suggests low involvement of biological agents probably related to efficient bio-security practices.

White 2004 spots on the liver were noted on 1% of the condemned livers. There is mention of spotty livers on the World Ostrich Association carcass grading system, but the pathology or pathogenesis is not explained (<http://www.world-ostrich.org/woacarcass.pdf>). However, this

condition is widely reported in the pig and is associated with infestations with *Ascaris suum* (Roepstorff et al. 1997). Owing to the retrospective nature of this study, the exact pathology or cause of the white spots could not be determined. Further studies on this aspect are therefore indicated, so that appropriate action could be taken to avoid the condemnations and possible poor performance of birds owing to liver involvement.

The absence of zoonotic conditions is also important to the ostrich industry since significant losses are attributed to condemnations related to these conditions in other livestock species (Mosienyane 1986). The total number of zoonoses is unknown, but according to Taylor et al. (2001), about 62% of 1,415 catalogued known human pathogens are of zoonotic origin. Various zoonotic conditions of ostriches have been documented, and include Crimean Congo haemorrhagic fever (CCHF), spongiform encephalopathy, anthrax, highly pathogenic avian influenza (H7N1), cryptosporidiosis, tuberculosis and salmonellosis (Schoon 1991; Vanhooser and Welsh 1995; Huchzermeyer 1997; Gray et al. 1998; Swanepoel et al. 1998; Sevcikova et al. 1999; Snowden and Logan 1999; Anonymous 2000; Capua et al. 2000), just to name a few. However, meat products from CCHF and spongiform encephalopathy affected ostriches do not constitute much of a public health risk (Huchzermeyer 1997; Swanepoel et al. 1998), as does blood from the same animals in the case of CCHF. The absence of zoonotic macroscopical findings in this study is suggestive that apart from ostrich meat being healthy meat owing to its intrinsic properties (Deeming 1999) it also remains among the meat types with low public health risks.

## Conclusion

Only offals were condemned, and 95% of the condemnations were mainly abattoir related, 80% due to contamination. The encountered organ condemnations (20%) were due to macroscopic anatomopathological or sensorial findings: congestion, enteritis, haemorrhage, pigmentation, white spots on the liver, and peritonitis. No whole carcasses or meat cuts were condemned. In addition, no macroscopical findings of a zoonotic nature were noted. Further studies on condemnation causes are therefore indicated,

so that appropriate action could be taken to avoid the condemnations and possible poor performance of birds.

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