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FINDINGS OF *LISTERIA MONOCYTOGENES* IN DUCK AND GOOSE MEAT AND LIVER

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Summary

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Two hundred and fifty seven samples (112 samples of goose meat and liver and 145 samples duck meat and liver) were analysed. From meat and liver of fattened geese, 40 *Listeria monocytogenes* isolates (35.7%) – 35 from serogroup 1 and 5 – from serogroup 2 and 6 *L. innocua* isolates (5.36%) were obtained. From duck meat and liver, *L. monocytogenes* organisms were isolated in 7 samples (4.8%), all of them belonging to serogroup 1. Furthermore, there were two single samples infected with *L. innocua* and *L. grayi*.

Key words: duck, geese, *Listeria monocytogenes*, meat contaminations

INTRODUCTION

It is known that all foodstuffs (milk and dairy products, meat and meat products, fish, crayfish, vegetables etc.) could be contaminated with *L. monocytogenes* in some of the stages of food processign technology (WHO, 1988a; 1988b). The exclusive resistance of the microorganism to low temperatures, low pH and high concentrations of sodium chloride (Shahamad *et al.*, 1980; Karakolev, 2000) is responsible for its long-time survival in foodstuffs. Despite the fact that cases of human listeriosis due to the consumption of meat products are more infrequent than those related to dairy products consumption, the occurrence of *L. monocytogenes* in meat and meat products remains a significant problem.

According to Gray and Killinger (1966), the contamination of processed meats and delicacies with *L. monocytogenes* in Europe varied between 6 and 12%. Schiemann *et al.,* 1990) observed listeriae in 75% of 20 samples of meat and meat products and 67.7% of all isolates were determined as *L. monocytogenes*. Truscott and McNab (1988) isolated listeriae in 58% of all analysed samples of minced bovine meat and reported that 21.9% of isolated strains were able to haemolyze sheep red blood cells. In the USA, 1600 sporadic cases of human listeriosis were registered in 1986–1987 as a result of consumption of poorly processed contaminated chickens with lethal issue in 400 patients (Shank *et al.*, 1996).

In Bulgaria, Monov *et al.* (1995) analysed 2699 samples of meat and viscera of cows (both healthy and ill, liable to slaughtering), calves, domestic and wild swine, does, deers and wild ducks; duck, goose, chicken meat and liver, muscle

stomach, skin and abdominal surface washings; water used for cooling avian carcasses, and did not evidence the presence of *L. monocytogenes*. The analysis of ill lambs and sheep liable to slaughtering for *L. monocytogenes* contamination yielded 20% positive samples.

Most probably, the various isolation frequency rate depends on the criteria for sampling, the specificity of the technology, the methods of analysis and other factors. In most cases, a contamination of product surface is reported.

Considering the contradictory literature data and high hygienic requirements for avian meat products, the aim of the present study was to examine the incidence of *L. monocytogenes* in duck and goose meat and liver in a randomly chosen region.

MATERIALS AND METHODS

Samples

Two hundred fifty seven samples were obtained from vaccuum-packed bags with frozen goose and duck meat and liver, originating from birds fattened in two settlements of a randomly chosen region in the course of the routine veterinary sanitary inspection for a period of 10 months. Furthermore, two samples of crushed maize used for fattening were analysed.

Isolation of L. monocytogenes

The samples of meat and liver were burned with a heated spatula and 25 g specimens were aseptically obtained from the product core. They were analysed according to ISO 11290-1:1996, including a primary enrichment in a half-concentrated Fraser broth (with recovery in decreased concentration of selective supplements), secondary Fraser broth enrichment, inoculation on Oxford and Palcam agar and identification of *Listeria spp.* and *L. monocytogenes*. The serotypization was done using O-listeria sera, made in Bulgaria.

RESULTS

The data from analysed samples are presented in Table 1. From all 257 meat and liver samples, 47 or 18.29% were positive for *L. monocytogenes*.

The frequency of isolation of listeria from goose meat and liver was the high-

Table 1. Findings of *Listeria spp*. in meat and liver from fattened ducks and goose

Products	Number of samples	Number (percentage) of positive samples			
		L. monocytogenes	*L. ivanovii*	*L. innocua*	*L. grayi*
Goose meat	72	21 (29.17)	0	5 (6.94)	0
Goose liver	40	19 (47.50)	0	1 (2.50)	0
Duck meat	84	5 (4.76)	0	1 (1.19)	1 (1.19)
Duck liver	61	3 (4.92)	0	0	0
Total	257	47 [18.29]	0	7 [2.72]	1 [0.39]

( ) percentage vs the number of samples from the respective product; [ ] percentage vs the total number of studied samples.

est. The positive samples for the respective products were 29.17% and 47.50%. From the 40 isolates, 35 were from serogroup 1 and 5 – from serogroup 2.

The incidence of *Listeria spp.* in duck products was lower – 4.76% and 4.92% positive samples for meat and liver respectively. All isolates were from serogroup 1.

Apart *L. monocytogenes*, in 7 of all 257 samples, *L. innocua* was recovered. One sample of duck meat was positive for *L. grayi*.

Two hundred and two samples of meat and liver (78.60%) were *Listeria*–negative. *L. monocytogenes* was also isolated from one sample of forage for fattening (crushed maize).

DISCUSSION

Our data could be interpreted in several directions. First, it must be emphasized that until now, such a wide distribution of *L. monocytogenes* in any group of foodstuffs has not been observed in our country. The percentages of positive samples were high, especially in goose liver (47.50%) and goose meat (29.17%). The microorganism was observed also in duck meat and liver although less frequently. Our data differed from those already reported (Monov *et al*., 1995), that stated a low incidence of *L. monocytogenes* in meat products in Bulgaria. It could be probably due to the various methods of analysis used by authors and the different experimental design (different sampling times including frequency of sampling, and various number of samples from one studied object). At the same time, our results corresponded with the data of other authors (Gray and Killinger, 1966; Schiemann *et al.*, 1990), who isolated *L. monocytogenes* from avian meat and meat products in 6–75% of studied samples.

Second, the isolation of *L. monocytogenes* from the core of meat and liver is an interesting fact. It does not exclude a superficial contamination but most probably suggests that the birds have become infected via the forage and the drinking water.

In our experiment, *L. monocytogenes* was isolated from the forage used for fattening of birds. This fact allows us to admit that one of the vectors of transmission of the microorganism are rodents whose life cycle could be accompanied by a *Listeria* carriership or morbidity. The dynamics of infection in rodents could be one of the causes for the sporadic high incidence of *Listeria* at a given moment and the lower prevalence of the organisms at another one.

The analysis of our data also raised the question about the role of *L. innocua* and *L. grayi*, isolated from studied foodstuffs, taking into account the fact that they are not pathogenic. According to Seeliger (1981), the presence of *L. innocua* and other apathogenic *Listeria* organisms in ecological and foodstuff samples is indicative for the possible presence of *L. monocytogenes* as well, since *Listeria spp*. inhabit the same ecological niches. Therefore, the occurrence of apathogenic *Listeria* must not be ignored. We believe that their presence have to be interpreted according to the opinion of Seeliger. So, the detection of apathogenic *Listeria* in foodstuffs or in samples obtained from the equipment of food processing has to be considered as a sign of contamination.

Our results evidenced the necessity of *L. monocytogenes* control along the entire technological process of duck and goose foodstuff production, including the eggs. Thus, the information about the critical points where a *Listeria* infection could

occur would permit adequate approaches for control and corrective steps.

CONCLUSIONS

From all 257 samples of meat and liver, obtained from fattened ducks and goose, 202 (78.60%) were *Listeria*–negative.

Forty seven samples (18.29% of the total number) were positive for *L. monocytogenes*. The positive specimens were: from goose meat 21, goose liver – 19, duck meat – 4 and duck liver – 3, that accounted for 29.17%, 47.50%, 4.76% and 4.92% of the number of samples obtained from the respective product.

L. monocytogenes was isolated from the core of meat and liver during the aseptical sampling.

REFERENCES

Gray, M. L. and A. H. Killinger, 1966. *Listeria monocytogenes* and listeria infection. *Bacteriological Review*, **30**, 309–382.

Karakolev, R., 2000. The survival of *L. monocytogenes* under the influence of some factors during the production of white brined cheese and kashkaval. PhD thesis, National Diagnostic and Reserach Veterinary Medical Institute, Sofia, pp. 59–67.

Monov, G., A. Pavlov, I. Kaloyanov and G. Nikolov, 1995. Incidence, methods of isolation and differentiation of *L. monocytogenes* in meat and meat products with a view to the establishment of references for veterinary sanitary assessment (final report of a scientific project, unpublished), National Diagnostic and Reserach Veterinary Medical Institute, Sofia.

Schiemann, D. A., S. R. Shope and M. J. Brown, 1990. Development of new enrichment broths and plating agar for isolation of hemolytic species of *Listeria*. *Journal of Food Safety*, No 4, 233–252.

Seeliger, H. P. R., 1981. Apathogene Listerien: *Listeria innocua sp. n. Zentralblatt für Bakteriologie Mikrobiologie und Hygiene, I-Abt. Orig. A,* **249**, 487–493.

Shahamad, M., A. Seaman and M. Woodbine, 1980. Survival of *Listeria monocytogenes* in high salt concentrations. *Zentralblatt für Bakteriologie Mikrobiologie und Hygiene, I-Abt. Orig. A,* **246**, 506–511.

Shank, F. R., E. L. Elliot, I. K. Wachsmuth and M. E. Losikoff, 1966. US position on *Listeria monocytogenes* in foods. *Food Control*, **7**, No 4/5, 229–234.

Truscott, R. B. and W. B. McNab, 1988. Comparison of media and procedures for the isolation of *Listeria monocytogenes* from ground beef. *Journal of Food Protection*, **51**, No 8, 626–628.

World Health Organization, 1988a. Foodborne Listeriosis, Geneva, 15–19 February.

World Health Organization, 1988b. Report of a WHO Informal Working Group. WHO/EHE/FOS/88.5, WHO, Geneva.

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