



Bovine lymph nodes as a source of *Escherichia coli* contamination of the meat



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Introduction

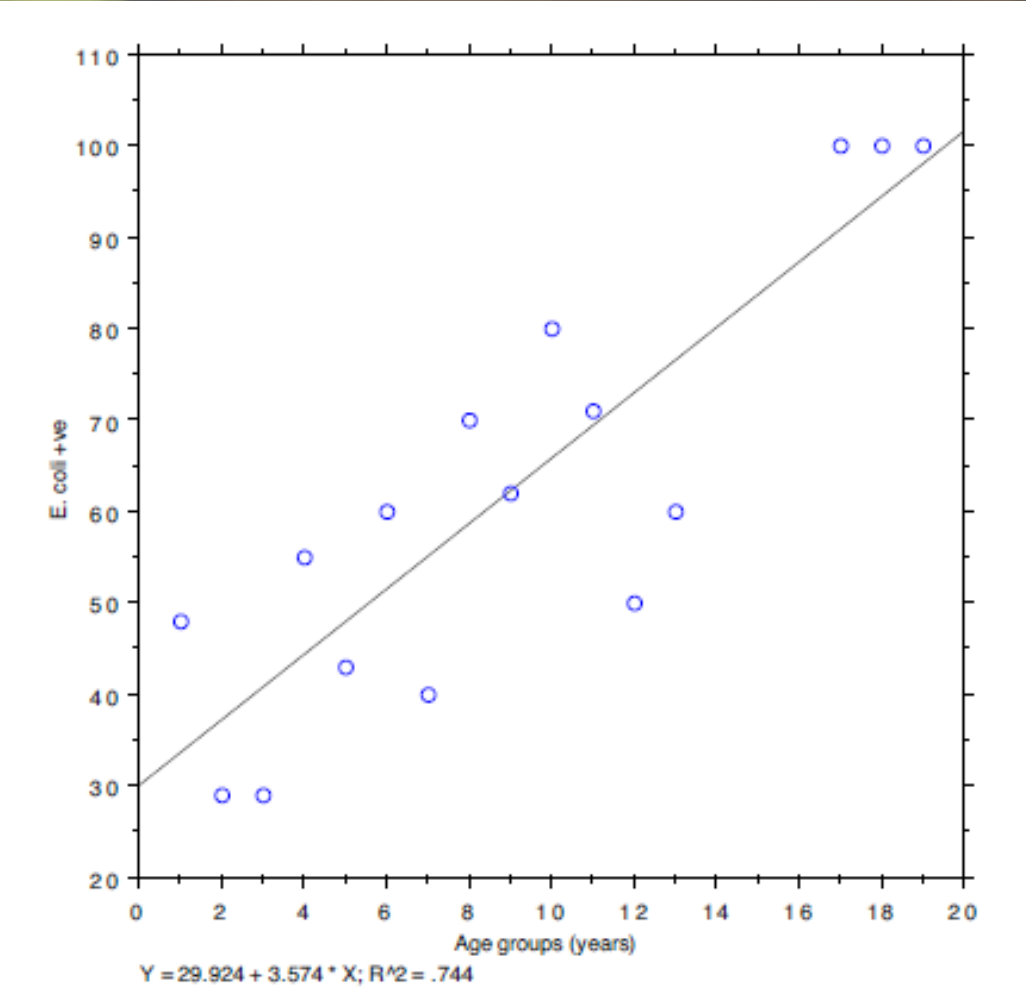
Ground beef contamination with *Escherichia coli* is usually a result of carcass faecal contamination during the slaughter process. Carcasses are contaminated when they come into contact with soiled hides or intestinal leakage content during dressing and the evisceration processes. A more recent and compelling hypothesis is that, when lymph nodes are present in manufacturing beef trimmings, they can be a potential source of *Enterobacteriaceae* contamination of ground beef. The aim of this study was to investigate the occurrence of *E. coli* in lymph nodes from beef carcasses used for ground meat production, in six slaughter plants situated in central Italy.

Materials and methods

A total of 597 subiliac (precrural) lymph nodes were obtained from 597 cattle carcasses and screened for *E. coli* by culture. Furthermore, *E. coli* isolates (one per positive carcass) were tested for *stx1*, *stx2*, *eaeA* and *hlyA* genes that are commonly used to identify and characterise shiga toxin-producing *E. coli* (STEC). In addition, the *E. coli* isolates were profiled for antimicrobial susceptibility.

Results

A proportion of 34.2% (204/597) carcasses were positive for *E. coli*. PCR revealed that 29% (59/204) of *E. coli* possessed *stx1* or *stx2* which corresponded to 9.9% of the cattle sampled. Moreover, a combination of *stx1* or *stx2* and *eaeA* was found in in 4 isolates (2% among *E. coli* positive samples and 1% among cattle sampled) and a combination of *stx1* or *stx2* and *eaeA* and *hly* in 1 isolate (0.5% and 0.2%). More than 95% of isolates were susceptible to gentamicin, ceftriaxone, ciprofloxacin and cefotaxime while high rates of resistance were recorded for cephalotin, ampicillin, tetracycline, tripe sulfa and streptomycin. The multivariate analysis identified “age” as the factor most closely related to *E. coli* positivity (either generic *E. coli* or STEC) in bovine lymph nodes.



Simple linear regression between the animal's age and the prevalence of *E. coli*.

Distribution of <i>E. coli</i> isolates.																	
	Tot	Gender		Age (months)		Diet		Distance (km)						Slaughter		Organs ^a	
		m	f	≤24	> 24	F	C	> 350	< 250	< 200	< 150	< 100	< 50	o	c	Yes	No
All samples	597	357	240	208	389	157	440	157	5	5	70	84	276	492	105	118	360
<i>E. coli</i>	204	112	92	56	148	36	168	36	1	1	25	38	103	155	49	44	116
<i>Stx1</i>	41	13	28	11	30	3	38	3	1	0	5	10	22	18	23	8	11
<i>Stx2</i>	23	7	16	7	16	3	20	3	0	0	0	2	18	21	2	10	12
<i>eaeA</i>	11	5	6	5	6	4	7	4	0	0	0	3	4	9	2	3	6
<i>hly</i>	34	26	8	13	21	10	24	10	1	0	4	8	11	31	3	12	21
<i>Stx1</i> OR <i>Stx2</i>	59	18	41	14	45	5	54	5	1	0	5	12	36	34	25	14	22
Cephalotin	183	98	85	51	132	34	149	34	1	1	23	33	91	139	44	43	101
Ampicillin	85	42	43	19	66	13	72	13	1	0	8	18	45	65	20	16	53
Tetracycline	38	20	18	16	22	9	29	9	0	0	6	8	15	29	9	8	23
Triple sulphonamides	30	16	14	14	16	8	22	8	0	0	4	5	13	24	6	7	17
Streptomycin	23	7	16	8	15	4	19	4	0	0	4	4	11	18	5	4	16
Sulphamethoxazole/trimethoprim	17	10	7	8	9	5	12	5	0	0	3	3	6	14	3	3	11

Gender: male (m) or female (f); diet: mainly forage (f) or concentrate (c); slaughter: ordinary (o) or casualty (c); organs condemned by veterinary inspection: yes or no.

^a For 119 animals, out 597, no data on organs condemnations were recorded by the official veterinarian.

Conclusions

In conclusion, subiliac lymph nodes represent a source of *E. coli* for ground beef. These results are of major importance for risk assessment and improving good manufacturing practices during animal slaughter and ground meat production.