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SOME OBSERVATIONS ON THE INCIDENCES OF SALMONELLA IN PIG CARCASES

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SUMMARY

An investigation has been carried out during the period April 1959 to May 1962 in order to obtain evidence of the incidence of salmonella in pigs. During this period some 1,500 faecal swabs were taken with only 9 proving positive. Some 2,000 lymph nodes were examined and in no case could salmonella be identified. The incidence of salmonella infection in pigs constituting this experiment appears to be substantially lower than is recorded in the literature.

Food-borne infections caused by Salmonella occur in all parts of the world and currently there is world-wide interest because of the apparent increase in Salmonellosis, especially among humans. In England and Wales reported cases of the disease increased from 1,367 in 1949 to 5,038 in 1959. (1,2.)

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Salmonella is a widely distributed organism and is often found in the intestinal tract of both human and animal. In man, almost every clinical case of Salmonellosis excretes organisms from the bowels in variable numbers for an unpredictable period of time, and there is always a possibility, as with animals, of their becoming carriers.

From a food hygiene point of view there is one major difference between human and animal carriers; the human carrier handling food, will probably be spreading the disease for a very long time to others through different food media, the animal carriers usually only once through their own carcases after death. The real danger can be seen in its true perspective if we are reminded that the Salmonella carrier rates among humans noted in different parts of the world have ranged from about 0.3% to over 30%.(3) In other words, assuming roughly the same degree of attention to hand-washing practices, the chances of food products becoming contaminated with Salmonellae of human origin are 100 times greater in some communities than in others. If we contemplate the spreading of the relatively new communal eating habits, without improving old techniques, it may be seen that some communities (hospitals, canteens, big catering organisations etc.) are in permanent danger of Salmonella infection.

The other source of infection is the contaminated carcase of a diseased animal. Salmonella infection in pigs has been known for some time. Pigs usually become infected by eating foods or drinking water contaminated by the organism but they do not necessarily become diseased because Salmonella may be

found in the intestinal contents of normal healthy pigs. The organism becomes virulent and actuates a diseased condition, only when the animal's vitality has been lowered by other factors.

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These predisposing causes of Salmonella infection in pigs may, therefore, be due to some dietetic defiency, bad housing, heavy parasitic infestation or the introduction of freshly infected pigs to the herd. Vitality and resistance can be lowered by unsound slaughterhouse practice, i.e. long transportation in unsuitable vehicles, keeping pigs in draughty lairages, and mixing pigs of different origin. The longer the pigs are kept in slaughter house lairages in excess of 24 hours then the greater is the danger of Salmonellosis. The findings of Galton(4) and her co-workers in Florida demonstrated that before slaughtering rectal or caecal swabs from pig carcases showed that up to 80% were infected with Salmonellae, although the incidence of positive rectal swabs among 374 pigs on 28 farms, averaged only 7%.

Under lairage conditions, the influence of inclement weather, i.e. wind, temperature and humidity may be important influences. Probably because of these circumstances, salmonellosis in pigs appears to have a seasonal incidence with the winter months being the worst.(5) The infected pigs, as with human beings, excrete salmonella in the faeces and urine. This was recently demonstrated by Parry et. al.(6) in lairages at the Conventry municipal abattoir and proved that the faeces of pigs often contain salmonellae of different serological types. From these results, however, it was difficult to draw any conclusive evidence as to whether the pigs were actually diseased or were permanent salmonella carriers. As has already been mentioned, pigs can either pass salmonella through their digestive tracts without themselves being affected, or they may sometimes harbour salmonella in their intestines, gall bladders or urinary ducts.

This condition is of the greatest significance with regard to meat hygiene, because if the resistance of such hosts is lowered the salmonella could penetrate into the blood stream contaminating the internal organs and the muscles. Thus the lymph nodes are primarily affected and the mesenteric lymph nodes being nearest to the origin of infection probably contain the organisms in the greatest numbers.

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In order to obtain evidence as to the incidence of salmonellosis in pigs the following investigation was carried out in the abattoir and the adjoining lairages of J. Sainsbury Ltd. The period covered by this investigation was from April 1959 until May 1962.

During the investigation 1,550 faecal swabs were taken from the pig lairages, 500 surface examinations were carried out on dressed carcases and 2,167 lymph nodes of 1,049 pigs were examined for salmonella.

The carcases examined were of normal healthy pigs taken indiscriminately for examination.

Technique

Faecal Swabs In the laboratory faecal swabs were transferred into 10 ml. selenite broth or tetrathionate medium which were then incubated for 48 hours at 37°C.

Skin surface swabs These were taken from the flank parts of dressed carcases in the abattoir and were treated similarly to the faecal swabs.

Lymph nodes Mesenteric, popliteal, superficial, external and internal iliac, ischiatic and superrenal lymph nodes were removed from the carcases in the abattoir and cut into small pieces. Subsequent treatment was identical to that with the swabs.

In all cases, following incubation, surface plating was carried out using Bismuth Sulphate and Deoxycholate citrate agar for a further 24 - 48 hours incubation at 37°C. Suspect colonies were sub-cultured and checked by slide agglutination using polyvalent salmonella sera.

Results

Results are shown in Table 1. During the period April 1959 to

May 1962 only nine cases of salmonella were isolated from faeces in pigs lairages. They were the types often found in farm animals. During this same period we were unable to isolate salmonellae from either the surface of the dressed carcases or from the lymph nodes.

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Discussion

1. We have been unable to establish any relationship between the salmonella content of pigs' faeces and salmonella contamination of the carcass meat.

2. It would appear that individual pigs temporarily discharge salmonellae without the pigs themselves being affected.

3. The real danger lies in the following possibilities:

(a) During prolonged transport (7) or long retention periods in excess of 24 hours in lairages adjoining slaughter houses, the resistance of the animals may be lowered, resulting in their becoming diseased either by the animals own salmonellae from the bowels or by the faecal matter from other pigs.

(b) Under unsatisfactory hygienic conditions in the lairages and abattoir, dressed carcases could also be contaminated by faeces.

Either case results in salmonella contaminated meat leaving the slaughter house.

4. In any region, additional circumstances such as the temperature at which meat is stored, method of handling, size of joint favoured and the mode of curing or cooking may determine the extent of salmonella contaminated meat.

5. If this whole question of salmonellosis is regarded in its true perspective, then it appears that the danger of human salmonellosis is far less from salmonellae normally isolated from animal than from human origin.

In our opinion the recent increase of human salmonellosis in England is not altogether due to increased salmonellosis among farm animals, but partly to the more accurate records relating

human salmonellosis and partly to changing communal eating habits where the same numbers of human salmonella carriers have much wider scope to contaminate food than ever before. The only solution appears to be the improvement of hygienic standards alongside our changing eating habits. As well as maintaining and improving slaughter house hygiene, further endeavours should be made to eliminate all human salmonella carriers from places where they are able to contaminate the food of communities with relative ease.

Conclusions

1. The incidence of salmonella in pig faeces and in carcase meat has been shown to be surprisingly low.

2. This investigation which forms part of a long term investigation into the incidence of salmonella in pigs, indicates that the possible hazards arising from the infection of pig carcases are probably over estimated provided there is careful control over pre-slaughter conditions and slaughter house sanitation.

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TABLE 1

Showing the types of Salmonella isolated from the lairages and pig carcases during the survey

	Pig Lairage	Carcase	Lymph Nodes
April, May, June 1959	Heidelberg 1 case Typhi-murium 1 case	no cases	no cases
July, Aug., Sept. 1959	Typhi-murium 1 case	"	"
Oct. Nov. Dec. 1959	Dublin 1 case	"	"
Jan. Feb. March 1960	No cases	"	"
April, May, June 1960	Heidelberg 1 case	"	"
July, Aug. Sept. 1960	No cases	"	"
Oct. Nov. Dec. 1960	Dublin 1 case	"	"
Jan, Feb. March 1961	No cases	"	"
April, May, June 1961	Typhi-murium 1 case	"	"
July, Aug. Sept. 1961	No cases	"	"
Oct. Nov. Dec. 1961	Dublin 1 case	"	"
Jan. Feb. March 1962	Dublin 2 cases	"	"
April, May 1962	No cases	"	"