

From the Regional Veterinary Laboratory, Sandnes, and the Public Inspection of Meat and Food, Stavanger, Forus, Norway.

## PATHOLOGICAL LESIONS IN SWINE AT SLAUGHTER

### I. BACONERS\*

By

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FLESJÅ, K. I. and H. O. ULVESÆTER: *Pathological lesions in swine at slaughter. I. Baconers.* Acta vet. scand. 1979, 20, 498—514. — An extended disease recording programme in pigs has been carried out by the meat inspection service at Sentralslakteriet, Forus, Stavanger. A data system including 57 disease codes has been applied. In the period 1975—1977 an average of 85,000 baconers were slaughtered yearly. About 39 % of these were given disease remarks; 42—47 % of the lesions were directly related to the parasites *Sarcoptes scabiei* (rind lesions) and *Ascaris suum* (white spots in the livers). The thoracic cavity was the most commonly affected part of the body with 30—35 % of all recorded lesions.

Sixteen disease codes occurred at frequencies above 0.3 %, and they encompassed approx. 97 % of all recorded lesions. Scabies occurred at an average of 12 % of the fatteners. Parasitic hepatitis of severe and moderate degrees were seen in about 11 %, pleurisy in 7 %, pneumonia — severe and moderate — in 5.4 %, pericarditis in 4.3 %, pyaemia and abscess/-es in 2.5 %, tail lesions in 2.3 %, perihepatitis and other non-parasitic liver lesions in 2.2 %, polyarthritis and arthritis in 1.7 %, tuberculous lesions in the cervical lymph nodes in 0.9 %, peritonitis in 0.9 % and atrophic rhinitis — external lesions — in 0.8 % of the carcasses. The majority of the other 41 disease codes occurred at frequencies below 0.1 %.

A seasonal variation was pronounced in scabies, numerous white spots in the liver, and tuberculous lesions in the cervical lymph nodes. It could be noted in pleurisy, pericarditis, perihepatitis and other non-parasitic liver lesions, arthritis and atrophic rhinitis, but not in pneumonias, moderate number of white spots in the liver, tail lesions, pyaemia, abscess/-es, peritonitis and polyarthritis.

disease recording; slaughter-house; post-mortem findings; bacon swine.

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The importance of organized meat inspection by skilled meat inspectors in preventing contagious diseases is well recognized. Many diseases have low mortality but high morbidity. They are often of a chronic character, with few and indistinct symptoms, but are supposed to cause considerable economic losses. Many such diseases can best be detected at slaughter. Modern data-processing makes it possible to record many diseases and lesions, and makes relevant information available to the owners and the veterinary authorities. In addition the computer can be used to demonstrate frequencies and fluctuations of the various diseases which, together with other available information, may form a sound basis for preventive measures.

An extended disease recording of this kind was established at the Scan-Vest slaughter-house at Skara, Sweden, in 1970 (*Hornwall & Bäckström* 1971). In 1973 a similar project was started at Sentralslakteriet, Stavanger, Norway, as part of a research programme "Preventive medicine in bacon swine production". The aim of this paper is to present the extended disease recording system and the occurrence of lesions in bacon swine.

#### MATERIAL AND METHODS

The material consists of bacon swine slaughtered 1975—1977 at Sentralslakteriet, Forus, Stavanger. Emergency-slaughtered pigs form less than 0.08 % of the total number and are not included in the recording for technical reasons.

The meat inspection is performed by a team of one veterinarian, who examines the carcass for abnormalities, and two or three lay-assistants who inspect the organs. The computer system employed makes it possible to record four disease codes per animal. Remarks are punched together with data concerning weight and carcass quality. Each carcass is identified by a serial number and a herd number. Two computer centres are involved. Landbrukets datasentral, Oslo, arranges the data and returns transcripts to the slaughter-house and the farmers. The data are then transferred to the Sentral for forsøksmetodikk og data-behandling, run by the Agricultural Research Council of Norway, for further processing.

The results presented in this paper are based on monthly transcripts of the various disease codes listed below.

## List of recorded diseases

05 — Sepsis, toxæmia	45 — Intersex
06 — Pyæmia	49 — Other pathological findings in the urogenital system
07 — Abscess/-es	50 — Polyarthritus
08 — Abnormal smell/-colour	51 — Arthritis
09 — Unfit, maltreated	52 — Lesions in claws and claw joints
10 — Rhinitis, atrophic	53 — Fracture
11 — Pneumonia, severe	54 — Rickets
12 — Pneumonia, moderate	59 — Other pathological changes in joints/bones
13 — Pleurisy	60 — Mange
14 — Pericarditis	61 — Decubitus
15 — Endocarditis	62 — Tail lesions — cannibalism
19 — Other pathological changes in heart/lungs	63 — Other wounds
20 — Lesions in the mouth	64 — Tumours, malignant
21 — Tuberculous lesions in the cervical lymph nodes	65 — Tumours, benign
22 — Tuberculous lesions in the mesenteric lymph nodes	69 — Other pathological changes in the skin
23 — Gastroenteritis	80 — Anaemia
24 — Peritonitis	81 — Emaciation
29 — Other changes in the gastrointestinal tract	82 — Jaundice
30 — Liver degeneration	83 — P.S.E. (total condemnation)
31 — Severe ascarid invasion (white spots), liver con- demned	84 — Muscular degeneration
32 — Mild/moderate ascarid in- vasion, liver partially con- demned	85 — Other muscular lesions
39 — Other lesions in the liver	90 — Tuberculosis (avian excluded)
40 — Nephrosis, nephritis, renal infarction	91 — Antrax
41 — Pyelonephritis	92 — Salmonellosis
42 — Uraemia	93 — Listeriosis
43 — Metritis/salpingitis	94 — Erysipelas
44 — Mastitis	95 — Trichinosis
	96 — Cysticercosis/echinococ- cosis
	97 — Leucosis
	98 — Dermatomycosis

In addition there are codes for total condemnation of the carcass (01), partial condemnation (02), only sanctioned for processing (03), only to be used for animal food (04), and detected antibiotics and chemotherapeutics (68).

Some of the codes will need a more precise definition. 10 — atrophic rhinitis is recorded only when deviation or shortening of the snout is observed. 11 — severe pneumonia (acute or chronic) is recorded when the greater part of all the front lobes are

affected, and when necroses and abscesses more than 2—3 cm in diameter are present together with affected pleura. 12 — moderate pneumonia means lesions affecting a minimum 5 cm of the tip of a front lobe up to half the areas of all four front lobes. 31 — severe ascarid infestation of the liver means numerous white spots. 32 — mild/moderate ascarid infestation of the liver is recorded when less than 10 white spots are present or maximum two lobes affected. 39 — other lesions in the liver mean mainly fibrous perihepatitis and occasionally fibrosis or congestion. 50 — polyarthritis (acute or chronic) means the affection of at least two major joints. 51 — arthritis is recorded when one or two joints (excluding the claw joint) are affected. 53 — fractures, excluding fractures caused by transport to and handling at the slaughter-house. 60 — sarcoptic mange is noted when there are numerous red papules in the rind after scalding, especially on the buttocks and the medial parts of the thighs. 62 — tail lesions are recorded when there is a tail wound, when the wound is healed but the tail is thickened and inflamed, and when the tail is obviously short.

## RESULTS

During the three-year period of investigation an average of about 85,000 fatteners were slaughtered annually (Table 1). Number of carcasses per month vary from 4,050 to 10,900 with an average of 7,100.

Only minor variations occur between the years. About 61 % of the pigs have no lesions. It can further be deduced that of the remaining 39 %, 66 % have only one lesion.

Table 1. Number of baconers slaughtered and the relative frequencies with no detected lesions (0) and one to four different pathological conditions.

Year	Number slaughtered	Number of lesions per carcass (relative frequencies)				
		0	1	2	3	4
1975	85,645	61.1	26.1	8.0	3.3	1.5
1976	83,405	61.6	25.6	8.0	3.3	1.5
1977	87,030	61.4	25.1	8.3	3.5	1.7
Total	256,080					

A marked predominance of certain diseases could be observed in the material. Only the most common pathological conditions are considered in this paper. Table 2 presents the occurrence of the 16 most common disease codes during the recording period.

Table 2. The most common disease codes and their frequencies.

Codes	1975		1976		1977		Total	
	number	%	number	%	number	%	number	%
06 Pyaemia	343	0.40	337	0.40	361	0.42	1041	0.41
07 Abscess/-es	1773	2.07	1683	2.02	1891	2.17	5347	2.09
10 Atrophic rhinitis	629	0.73	616	0.74	776	0.89	2021	0.79
11 Severe pneumonia	643	0.75	701	0.84	773	0.89	2117	0.83
12 Moderate pneumonia	4127	4.82	3715	4.45	3872	4.45	11714	4.57
13 Pleurisy	5465	6.38	5711	6.85	6670	7.66	17846	6.97
14 Pericarditis	3732	4.36	3569	4.28	3627	4.17	10928	4.27
21 Tuberculous lesions in the cervical lymph nodes	824	0.96	825	0.99	720	0.83	2369	0.93
24 Peritonitis	728	0.85	635	0.76	691	0.79	2054	0.80
31 Liver white spots (cond.)	8669	10.12	7169	8.60	6887	7.91	22725	8.87
32 Liver white spots (partial cond.)	2892	3.38	1562	1.87	1155	1.33	5609	2.19
39 Other liver lesions	1835	2.26	1918	2.30	1864	2.14	5617	2.19
50 Polyarthritits } 51 Arthritits }	1451	1.69	1429	1.71	1572	1.81	4452	1.74
60 Scabies	9495	11.09	10132	12.15	10230	11.76	29857	11.66
62 Tail lesions (cannibalism)	1722	2.01	2423	2.91	1710	1.96	5855	2.29
Total (16 lesions)	44328		42425		42799		129552	
% of all noted lesions		97.5		97.4		97.0		97.3
Other lesions (41 lesions)	1113	2.5	1145	2.6	1306	3.0	3564	2.7
Total number of lesions	45441	100	43570	100	44105	100	133116	100

Table 2 shows that the listed 16 codes encompass 97.3 % of all registered lesions. Lesions directly caused by the parasites *Sarcoptes scabiei* and *Ascaris suum* account for 42—47 % of all recordings. Other 30—35 % concern various pathological conditions in the thorax.

Fig. 1 shows the monthly variation in the number of carcasses with lesions. Between 34 and 46 % of the slaughtered pigs have at least one pathological lesion. There is a tendency towards a winter and a summer peak.

The relative monthly frequencies of pyaemia and abscess/-es range from 0.2 % to 0.7 % and from 1.5 % to 2.7 %, respectively.

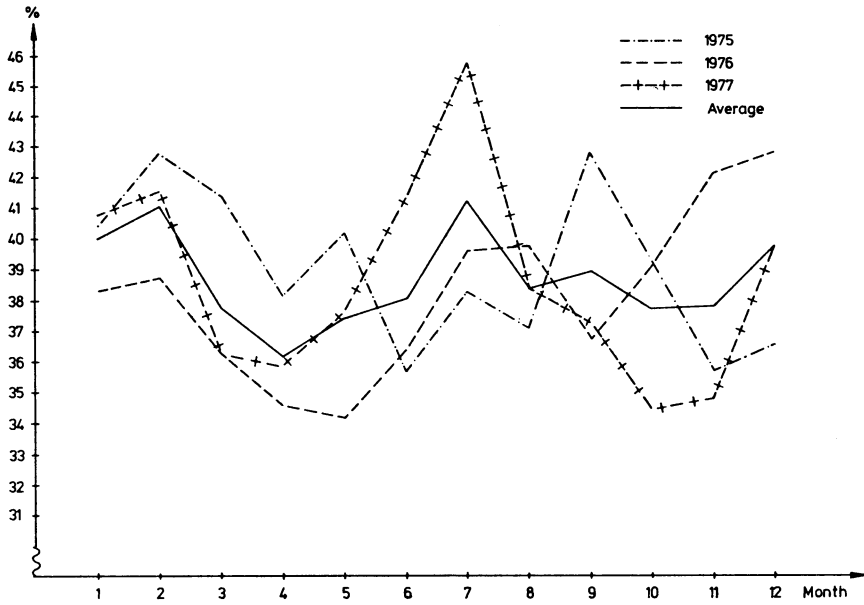


Figure 1. Frequency of baconers having one or more lesions.

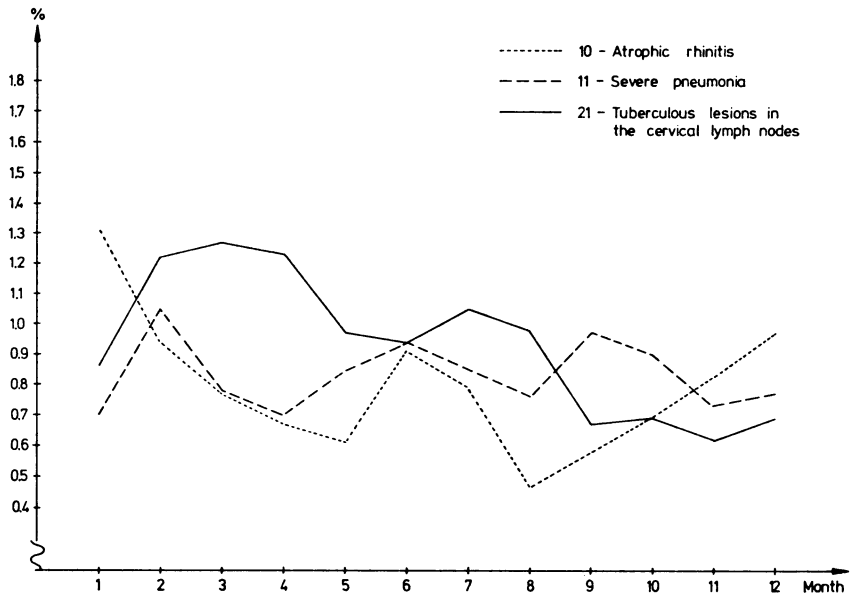


Figure 2. Frequencies of code 10 — Atrophic rhinitis, of code 11 — Severe pneumonia and of code 21 — Tuberculous lesions in the cervical lymph nodes (averages of three years).

Together they represent nearly 4.8 % of the total number of recorded lesions. There is no evidence of any seasonal variation.

In Fig. 2 is presented the relative occurrence of atrophic rhinitis, i.e. obvious deviation or shortening of the snout. The monthly frequencies vary from 0.3 to 1.5 % and constitute around 1.5 % of the total number of lesions. The peak period is November-December-January, but high values also occur in June-July.

Pneumonia (Figs. 2 and 3) is observed in about 5.4 % of the carcasses and represents approx. 10.4 % of all lesions. The ratio between severe and moderate forms is close to 1:5.5. The percentage of the severe type varies between 0.3 and 1.5 and of the moderate form between 3.2 and 5.8. Although indicated by the average curves, there is no obvious seasonal variation in the occurrence of these lesions as there are considerable differences between the annual curves.

Pleurisy (Fig. 3) is one of the commonest lesions observed in fatteners. It occurs on an average in around 7 % and comprises 12—15 % of the total number of recorded lesions. The frequencies vary between 5 and 10 %. The annual curves have a drop in March and the highest levels in May, June, July.

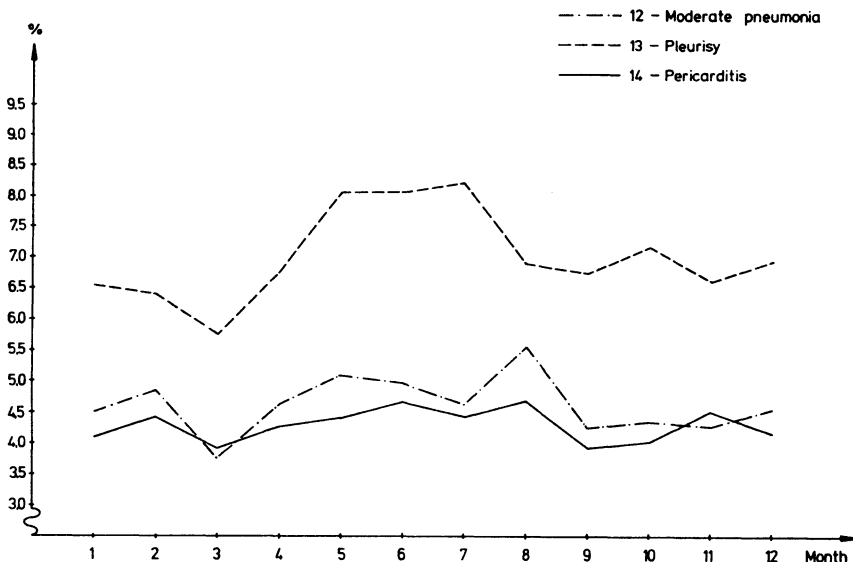


Figure 3. Frequencies of code 12 — Moderate pneumonia, of code 13 — Pleurisy and of code 14 — Pericarditis (averages of three years).

Pericarditis (Fig. 3) is another frequently recorded disease. It is demonstrated on an average in 4.3 % of all animals and makes about 8 % of all recorded lesions. There are no great differences between the level in the summer and the other seasons, but the annual curves correspond so well that they may justify a conclusion of seasonal variation.

Tuberculous lesions in the cervical lymph nodes (Fig. 2) are observed in scarcely 1 %, and comprise 1.7 % of all recorded lesions. The percentages range between 0.5 and 1.4. The lesion shows a rather clear seasonal variation with the highest scores in February-March-April and with a decline in the curve throughout the rest of the year.

Peritonitis is diagnosed in approx. 0.9 % of the carcasses, which makes approx. 1.6 % of recorded lesions. The monthly variations vary between 0.5 and 1.3 %. There is no distinct seasonal variation, although the average figures may indicate a higher winter and summer level than in spring and autumn.

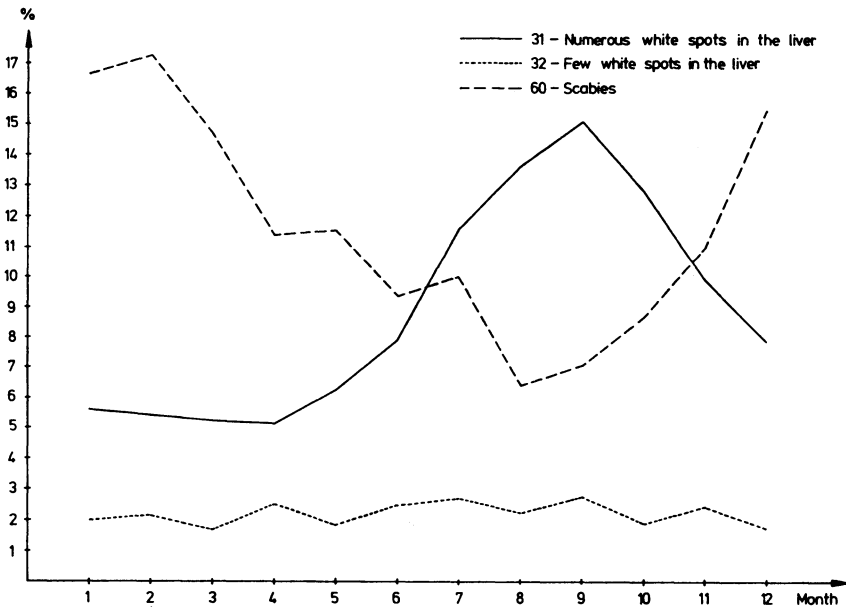


Figure 4. Frequencies of code 31 — Numerous white spots in the liver, of code 32 — Few white spots in the liver and of code 60 — Scabies (averages of three years).



The frequencies of numerous white spots in the liver are demonstrated in Fig. 4. About 9 % of the livers were given code 31, and this makes up 17 % of all recorded lesions. The monthly frequency ranges from 3.4 % to 17.1 %. There is a strong seasonal variation with a peak in August-September-October.

Few or a moderate number of white spots occur in about 2.2 % of the livers (Fig. 4), i.e. nearly 6.5 % of the noticed lesions. The frequencies vary from 0.7 to 5.1 %, but without any regular seasonal pattern.

The frequencies of perihepatitis and other non-parasitic liver lesions (code 39) are shown in Fig. 5. The relative numbers vary between 1.4 and 3.0 % with an average of 2.3 % or 4.2 % of the total number of recorded lesions. The curve indicates a seasonal variation with the highest values in autumn and winter.

Polyarthritis and arthritis occur in a little more than 1.7 % of the baconers and represent 3.3 % of the recorded lesions. The ratio polyarthritis/arthritis is approx. 1:6. The frequencies of polyarthritis are between 0.1 and 0.4 %. No seasonal variation is observed. Arthritis varies monthly between 1.0 and 2.0 % of

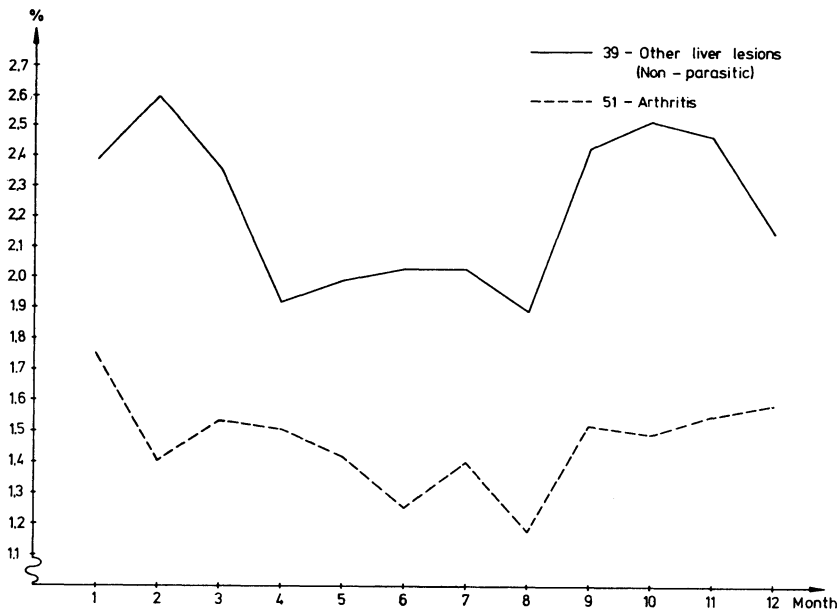


Figure 5. Frequencies of code 39 — Other liver lesions (Non-parasitic) and of code 51 — Arthritis (averages of three years).

the killed fatteners. Fig. 5 suggests a seasonal variation with the lowest values in June-July-August. There is no convincing monthly parallelism in the occurrence of these two codes.

Code 60 — the scabies code — is the one most often used in the recording system. The characteristic rind changes are noticed in approx. 12 % of all slaughtered pigs. They amount to 22.5 % of the total number of recorded lesions. The lowest monthly registration is 5.4 % and the highest 19.2 %. The diagram (Fig. 5) demonstrates a definite seasonal variation with high winter frequencies and a gradual drop in the curve until August.

Tail lesions — cannibalism — are found in 2.3 % of the pigs and constitute approx. 4.4 % of the total number of lesions. The highest monthly relative figure is 5 %, the lowest 1.5 %. No seasonal variation is detected, but annual fluctuations are considerable.

Among "Other lesions" the most prominent findings are: Tuberculous lesions in the mesenteric lymph nodes, which occur in about 0.1 %, intersex which was found in 0.2 %, claw lesions in 0.3 %, other pathological lesions in the skin in 0.2 % and anaemia in about 0.3 % of the slaughtered pigs. None of them shows special patterns. Pathological lesions hitherto not mentioned are seen at frequencies below 0.1 %.

## DISCUSSION

The recording system which was used in this project is comprehensive and rather ambitious, but there are weak links in the chain. The speed of the conveyor demands constant vigilance, and quick decisions have to be made. The use of laymen as organ inspectors may result in a rather rough classification of lesions. As there is room for only four diagnoses per animal, some may be left out. In addition there is a preference for lesions implying economic consequences. It took almost two years before all data routines became satisfactory.

The number of carcasses with pathological lesions is in accordance with published data on the subject from Denmark and Sweden (*Larsen & Bäckstrøm* 1971, *Balzer* 1973, *Bäckstrøm & Bremer* 1976). A considerable difference, however, in the disease pattern can be noticed. In Denmark and Sweden abscesses

have been found in 0.7—1.4 % of slaughtered pigs (*Madsen* 1964, *Cederwall & Holm* 1974, *Bäckstrøm & Bremer*) and pyaemia in about 0.2 % (*Madsen*). The respective frequencies in our material are somewhat higher. The reason is not quite clear, but there is a known relation between these two codes and cannibalism which is also more frequent in this survey.

Atrophic rhinitis is observed in most pig raising countries, and the frequencies vary from 1.5—45 % (*Madsen, Switzer & Farrington*, 1975, *Penny & Mullen* 1975). Compared to referred publications the frequencies of this disease are rather low in our material. The main reason is probably the recording routine, since only obviously short or deviating snouts are noted at Sentralslakteriet. *Penny & Mullen* demonstrated that just 0.34 % of the affected pigs showed external abnormalities, so the factual numbers are probably much higher. The high winter frequencies cannot be clearly explained, but they are possibly influenced by environmental factors, such as cold, and high humidity. A considerable number of pig farmers use a strictly batch rearing system with two outputs per year. There is a predominance of pigs reared in late autumn because of high pre-Christmas prices of pork. Thus overcrowding could also be a factor predisposing for atrophic rhinitis. The slow growing pigs of this batch will be slaughtered early in the new year. It has been shown that atrophic rhinitis causes retardation of growth (*Bäckstrøm et al.* 1976). Accordingly a relatively high number of atrophic rhinitis pigs could be expected in January. Fig. 3 also shows a top in June-July, at a time when the retarded pigs of the first batch of the year are slaughtered.

The incidence of pneumonia is recorded by many authors and varies from 20 to 95 % of slaughtered swine (*Nordfeldt et al.* 1950, *Young* 1956, *Fogedby* 1967, *Goodwin & Whittlestone* 1967, *Mandrup* 1967, *Larson & Bäckstrøm, Tielen* 1974). According to the same authors the overall majority of these pneumonias had an appearance indicating *Mycoplasma suis* pneumonia infections. *Fogedby* demonstrated a seasonal variation in the occurrence of this disease and the same is reported from Holland and Sweden (*Truijen* 1967, *Cederwall & Holm, Bäckstrøm & Bremer*). The frequencies of pneumonia in our material show an average of 5.4 % which is very low in comparison to the referred investigations. It is hard to say whether this is a real difference or the result of a different recording level. We think the latter is the

main reason. A positive correlation, however, between pneumonia and the size of the herd has been demonstrated (*Larson & Bäckstrøm, Lindqvist 1974, Bäckstrøm & Bremer, Aalund et al. 1976*). As about 75 % of the fatteners in our district are reared by farmers producing less than 300 pigs a year, this may also partly explain our relatively low figures.

Pleurisy occurs at about the same rate as reported from Sweden (*Bäckstrøm & Bremer*), while a Danish survey (*Madsen*) showed somewhat lower frequencies (from 2.4 to 4.2 %). In common with *Lindqvist* and *Bäckstrøm & Bremer* we have traced a seasonal variation of this lesion with the highest frequencies in the summer. The recorded pleurisy is mainly chronic and sterile, indicating an early infection. It seems as if pigs born in the cold season are most exposed to infection.

The incidence of chronic adhesive pericarditis in slaughtered baconers has been recorded as 2.6—3.2 % by Swedish investigators (*Lindqvist, Bäckstrøm & Bremer*). Our material shows a higher average but, as also *Bäckstrøm & Bremer*, we have observed a seasonal variation with the highest frequencies in the summer. In addition there is a partial parallelism in the occurrence of pleurisy and pericarditis.

The incidence of tuberculous lesions in the cervical lymph nodes looks rather high compared to available reports (*Thoen & Karlson 1975*). It has been demonstrated that sawdust can contain mycobacteria and under certain conditions enrich the growth of such bacteria (*Kleeberg & Nel 1969, Uhleman et al. 1975, Flesjå et al. 1978*). As almost all pigs in our material are reared indoors on sawdust bedding, this may possibly account for the high incidence. Most bedding is used in the cold season, at a time when it is hard to get good quality sawdust. This may to some degree explain the high winter frequencies.

White spots in the liver are noted in 9—14 % of all fatteners. The frequency of this lesion is, according to Swedish and Danish reports, 20—40 % (*Bäckstrøm & Bremer, Nielsen & Larsen 1976*) and causes total condemnation of 2.3—6.5 % of the livers. Age and weight differences at slaughter may be of significance in this respect. It has been demonstrated that decreasing frequencies of white spots occur at carcass weights over 70 kg (*Bäckstrøm & Bremer*). The average slaughter weight in our material was 76.2 kg, while it was some 70 kg in Sweden and under 70 kg in Denmark at the time of the referred record-

ings. We have also noted decreasing annual frequencies, which may be attributed to an intensified antiparasitic programme, but at the same time there has been an increase in average slaughter weight from 75.6 to 78.1 kg which must also be considered. The high condemnation figures in our material can probably be accredited to a stricter evaluation than that practised in Denmark and Sweden (*Lindqvist, Nielsen & Larsen*). The observed seasonal variation corresponds with that observed by *Fagerberg & Persson* (1960) and *Ronéus* (1966). The main reason for this pattern is probably that embryonation of *Ascaris suum* eggs are restricted to the summer season (*Persson & Lindqvist* 1975, *Connan* 1977). No parallelism between mild/moderate and severe infestation could be detected. The classification may be influenced by the working conditions of the meat inspectors who may condemn relatively more white spotted livers in periods with a high workload.

Other lesions in the liver occur at the same levels as found by *Bäckstrøm & Bremer*. In contrast to them, however, we observed a tendency towards a seasonal variation with the highest frequencies in the cold season. Although there may be a relation between perihepatitis and thoracal serositis, there is no obvious parallelism between code 39 and pleurisy, pericarditis or peritonitis.

The frequencies of arthritis and polyarthritis are twice as high as indicated in available reports (*Madsen, Lindqvist, Bäckstrøm & Bremer, Nielsen & Larsen*), and the figures would appear to be increasing in the recording period. The reason is unknown and could be causal. No attempt has been made to differentiate infectious arthritis from other joint lesions. Some of them are probably of the osteochondrosis/arthrosis form, which are mainly influenced by genetic factors. The seasonal variation (code 51), however, seen in our material may indicate other factors, both climatic and infectious.

Scabies seems to occur at high frequencies in bacon swine. It has been questioned whether our findings are real scabies, as it has not been possible to detect mites in histological sections of the scalded rind. However, our investigation demonstrated that only parts of the stratum germinativum persisted after scalding and accordingly the mites had been removed. A local hyperaemia and moderate cell infiltration were observed in the corium. There are two factors indicating that our scabies record-

ing is real. A resolute antiparasitic programme gives fairly good results (*Flesjå* 1978, unpublished), and there is a clear seasonal variation in the occurrence. The reason for the high winter frequencies could be the mentioned relative concentration of pigs in this period and superficial cleaning before introducing new pigs in the sties. A thorough cleaning is often omitted in winter as the procedure causes wet, cold and unpleasant conditions for arriving piglets. There are also indications that at least some *Sarcoptes* mites can survive longer outside the host by temperatures around 8–10°C than by room temperatures (*Helle* 1975, personal communication).

Tail biting is supposed to be provoked by stress. With an overweight of fatteners produced in the autumn and thereby a possibly relative overcrowding, we might have expected a peak for the lesion in this period. However, an unexplained annual variation is more likely. Some authors report considerably lower frequencies than that observed in our survey (*Bäckstrøm & Bremer, Aalund* 1978). Bedding, especially straw, has proved a tail biting prophylactic (*Haarbo et al.* 1966, *Høgsved* 1969). Very little straw bedding is used in the recording area. This may partly account for the relatively high figures. However, there are obvious differences in the recording level and accordingly the figures are not comparable.

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## SAMMENDRAG

*Patologiske funn på svin ved slaktning. I. Slaktesvin.*

Ved Sentralslakteriet, Forus, Stavanger foregår en utvidet sjukdomsregistrering med mulighet for differensiering av 57 ulike sjukelike tilstander hos gris. I perioden 1975—1977 ble det årlig slaktet ca. 85.000 slaktegriser. Av disse hadde ca. 39 % en eller flere (maksimum 4) sjukdomsanmerkninger. 42—47 % av anmerkningene ble satt i direkte forbindelse med parasittene *Sarcoptes scabiei* (røde papler) og *Ascaris suum* (hvite leverflekker). *Brysthula* var den region hvor en oftest fant forandringer. Disse utgjorde 30—35 % av alle sjukdomsanmerkningene.

Seksten sjukdomskoder opptrådte med frekvenser over 0,3 % og de utgjorde ca. 97 % av alle sjukelike forandringer. Skabb ble registrert på gjennomsnittlig 12 % av alle slakt. Hvite leverflekker ble funnet hos ca. 11 %, pleuritt hos 7 %, lungebetennelse (utbredt og moderat) hos 5,4 %, pericarditt hos 4,3 %, pyemi og abscesser hos 2,5 %, halesår hos 2,3 %, perihepatitt og andre non-parasittære leverforandringer hos 2,2 %, polyarthritt og arthritt hos 1,7 %, tuberkulose-lignende forandringer i halslymfeknutene hos 0,9 %, peritonitt hos 0,9 % og nysesjuka (tryneforandringer) hos 0,8 % av slaktene. Det overveiende flertall av de øvrige 41 kodene ble sett ved frekvenser under 0,1 %.

En sesongmessig opptreden var meget tydelig for skabb, multiple hvite leverflekker og tuberkulose-lignende forandring i halslymfeknutene. Det syntes også å være en sesongmessig opptreden av pleuritt, pericarditt, perihepatitt og andre non-parasittære leverforandringer, arthritt og nysesjuka, men ikke for lungebetennelse, moderate antall leverflekker, halesår, pyemi, abscesser, peritonitt og polyarthritt.

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