

# A Survey of Ascariasis in Pigs at Processing Plants in Korea

Donal P. Conway, Ph.D.

*Pfizer Corp., Asia Management Centre (G.P.O Box 573, Hong Kong)*

Young-Sun Hong, D.V.M., MPH.

*Department of Technical Service, Pfizer Korea Ltd.*

## Introduction

The intestinal parasite *Ascaris suum* has been reported in all recent surveys of internal parasites of pigs in Korea. Based on the examination of fecal samples for *Ascaris* eggs, Lee *et al.*<sup>12)</sup> reported an occurrence of 11% in 2550 samples from pigs in Southern Korea, while Kim *et al.*<sup>11)</sup> reported an occurrence of 64% in 1000 samples examined. Jang<sup>8)</sup> recorded an occurrence of 25.6% in a survey of 395 pigs in the Chungju district, and more recently Kang *et al.*<sup>9)</sup> reported an overall occurrence of 29% in samples from pigs from the Central, Young-Nam and Ho-Nam districts.

The variation in the occurrence of *Ascaris* eggs in fecal samples from a low of 11% to a high of 64% may be attributed to a number of factors. These include the age of the *Ascaris* population at the time of sampling,<sup>3)</sup> the season of the year,<sup>2)</sup>

the level of host immunity,<sup>13)</sup> random variation associated with sampling and the distribution of worm eggs in feces.

An alternative way to measure the occurrence of *Ascaris* is by examining the livers of pigs at the time of slaughter for the typical fibrotic or white spot lesions caused by migrating ascarid larvae.<sup>5)</sup> The main advantages of this method are the substantially greater chance for demonstrating the presence or absence of recent infection based on the typical lesions, and the speed at which many pigs can be examined in just a few

hours.

In order to demonstrate these advantages, a survey was conducted at three processing plants in Korea with the objective of recording the occurrence of liver damage due to *Ascaris* infections in pigs at slaughter. The results are presented here.

## Materials and Methods

Three meat processing plants, one each in Seoul, Daegu and Busan, were selected on the following basis:

1. Medium to large plants slaughtering a minimum of 200 to 300 pigs per day.
2. Located in areas where pigs representing a cross section of farm production were processed.
3. Processing lines that conveniently allowed access to observe the livers at the time of removal from the pig.

Two people were positioned at a point in the processing line where the liver was removed from each pig. The liver was placed on a table, washed quickly in cold water, and examined for typical white spot lesions and interlobular fibrosis caused by the migrating larvae of *A. suum*. A lesion score was assigned as follows: Normal=1, a few white spot lesions=2, a moderate number of white spot lesions=3, and numerous white spot lesions with extensive interlobular fibrosis=4.

Breeding animals (culls) were excluded from the survey. The survey was conducted on three

successive days during the week of 18th October, 1982.

## Results

The livers from 960 pigs were examined at the three locations (Table 1). The greatest number of livers examined was in Seoul (518 pigs).

A total of 547 livers(57%) showed some evidence of white spot lesions and fibrosis due to *Ascaris* migration(Table 1). A total of 420 livers(43.8%) were assigned a lesion score of 2, 120 livers (12.5 %) a score of 3, and 7 livers (0.7%) a score of 4. The greatest occurrence of lesions was found in the pigs examined in Busan (68%), and the least in Seoul (52%). The mean lesion scores for the pigs with liver lesions (i.e. +2, +3, or +4) were 2.16, 2.28 and 2.36 for Seoul, Daegu and Busan, respectively. The lesions included well defined, diffuse white spots to a more generalized fibrosis with thickened interlobular septa (Figs. 2-5). Some of the white spot lesions were slightly raised and densely fibrotic indicating a relatively recent origin. Others were less intense in appearance, smaller and smooth. These were considered to be older and resolving.

**Table 1.** Incidence of *Ascaris* Lesions on Livers

Lesion score*	No. of pig livers examined			
	Seoul	Daegu	Busan	Total
1	250	84	79	413
2	227	79	114	420
3	40	28	52	120
4	1	1	5	7
Total pigs	518	192	250	960
Total score	828	330	483	1,641
Av. score**	1.60	1.72	1.93	1.71

\* : 1=Normal, 2=A few white spot lesions, 3=A moderate number of white spot lesions, 4=Numerous white spot lesions with interlobular fibrosis.

\*\* : Includes pigs with normal livers(+1). Mean scores for pigs with lesions(+2, +3, +4) were 2.16, 2.28, and 2.36 for Seoul, Daegu and Busan, respectively.

Many ascarid worms were on the floor where the intestines were being opened by workers(Fig. 6). Most were mature size, but some immature worms were also observed.

## Discussion

The results of this survey indicate a generally higher level of ascariasis than would be expected from previous surveys except for the results reported by Kim *et al.*<sup>11)</sup> This difference is probably due to the difference in the methods used in making the surveys. All of the previous surveys depended on finding *Ascaris* eggs in fecal samples. If many samples were obtained from pigs infected only with migrating larvae or immature worms, then the actual level of ascariasis would be substantially underestimated. A survey based on the finding of characteristic lesions such as white spots is more likely to show actual levels of infection.

The development of white spot lesions and interlobular fibrosis generally involves repeated infection with *Ascaris* larvae.<sup>5,6)</sup> The white spots normally persist for periods up to five or six weeks, whereas the interlobular fibrosis may last much longer.

Since resolution of the white spots occurs within five to six weeks after infection, the evidence from this survey indicates that many pigs are infected by *Ascaris* throughout the growing period right up to the time of slaughter.

It would appear from these results that pigs begin to acquire infection upon arrival in the growing facility from the infective-stage eggs in the pens. The severity of infection, however, depends on the type of facility<sup>7)</sup>, the level of sanitation maintained, and the age of the housing itself. Older housing usually has more contamination with *Ascaris* eggs than new housing.

As worm infections mature in the pigs, the growing pens become further contaminated with *Ascaris* eggs. This insures spread of the infection. Succeeding groups of young, susceptible pigs that are moved into such facilities are sometimes exposed to severe infections of migrating *Ascaris*

due to the level of egg contamination left by the preceding group.

The results of this survey are also consistent with the results from recent studies in France, the Netherlands, Sweden and the U.S.A.<sup>1,4,10,14,15</sup> These workers reported a frequent occurrence of white spot lesions on pig livers at slaughter. The damage caused by the migrating worms in addition to affecting pig performance frequently leads to partial or total condemnation of many livers.

Finally, these results suggest that a similar level of infection might also exist in starter facilities, but further study is needed. However,

the present results clearly indicate a need for improved programs for the prevention and control of *A. suum* in young pigs.

### Summary

A survey of ascariasis in pigs (960) at three processing plants in Seoul, Daegu and Busan, Korea demonstrated that ascariasis was a common problem in pigs. *Ascaris* lesions (white and generalized fibrosis) were observed on 547 livers (57 %) of the pigs. The greatest occurrence of *Ascaris* lesions (68%) were found in pigs from the Busan area.

### Legends for Figures

**Fig. 1.** Normal liver.

**Figs. 2 and 3.** Livers with a moderate number of white spot lesions.

**Figs. 4 and 5.** Livers with numerous white spot lesions and extensive interlobular fibrosis.

**Fig. 6.** *A. suum* washed from the intestines from several pigs.

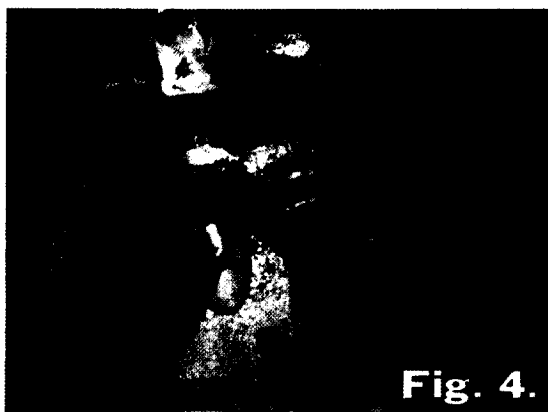




**Fig. 2.**



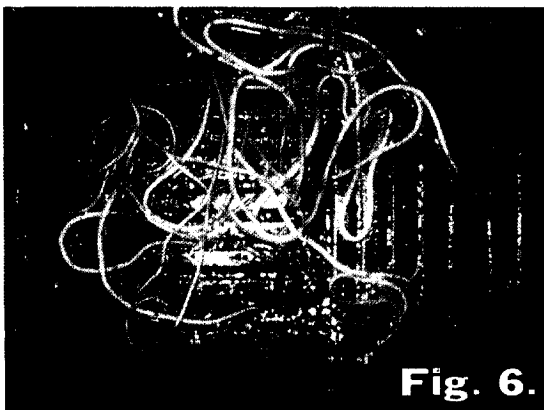
**Fig. 3.**



**Fig. 4.**



**Fig. 5.**



**Fig. 6.**

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## 國內屠畜場에서 實施한 豚 蛔虫感染實態 調査

Donal P. Conway

화이자 아시아 메베즈멘트센터

洪 英 善

한국화이자주식회사 농축부

## 抄 錄

근래 대규모의 기업양돈경영과 위생적인 사양관리, 현대화된 돈사 및 시설로 인하여 회충의 감염이 크게 감소 하였을 것으로 예상하고 돼지의 회충감염실태를 조사하기 위하여 비교적 큰 규모의 기업양돈업자들이 이용하는 서울, 대구, 부산 등의 3개 대규모 도축장을 대상으로 선정하였다.

서울 518두, 대구 192두, 부산 250두로 총 960두의 돼지간을 직접적출하여 유충이행으로 나타난 병변을 기초로 회충의 감염실태를 조사한 결과 다음과 같았다.

1. 회충의 유충이행으로 인하여 간장부위에 섬유소 및 백색반점의 병변이 출현되었는데 이러한 관찰로 약 547두 (57%)의 돼지가 회충에 감염된 것을 알 수 있었다.

2. 7두의 (0.7%) 간에서는 극심한 병변(+4), 120두 (12.5%)는 심한 병변(+3), 420 (43.8%)는 가벼운 병변(+2)으로 나타났다.

3. 부산지역의 돼지간에서는 가벼운병변 (+2)이상이 68%를 보였고, 서울에서는 52%로 다음 순위로 나타났다.

4. 1963년 (이), 1969년 (김), 1975년 (장), 1981년 (강)의 조사결과와 비교해 볼때 회충의 감염실태가 다소 변화하고 있었으나 구충문제는 아직도 중요한 과제로 더욱 연구가 요망된다.