

# AN INTEGRATED PROGRAM USING TAKTIC® TO CONTROL MANGE IN SWINE<sup>1</sup>

S. M. Gaafar,<sup>2</sup> J. J. Arends,<sup>3</sup> A. Hogg,<sup>4</sup>  
K. H. Holscher,<sup>5</sup> and R. E. Williams<sup>6</sup>

**Abstract:** An integrated treatment program for sarcoptic mange control using TAKTIC® (amitraz) 12.5% EC was evaluated at eight, privately owned, farrow to finish swine facilities in a four-state area. At all locations the treatment program consisted of an initial whole-herd treatment phase followed by scheduled treatments applied in conjunction with routine management practices.

Evaluations of mite scrapings taken at scheduled pretreatment and posttreatment intervals showed a 50 - 100% reduction in sarcoptic mange infestation levels following implementation of the TAKTIC® treatment program which consisted of an initial treatment and a maintenance schedule. Comparison of pretreatment and posttreatment production records showed 10 - 15 d earlier maturity in finishing pig market weight, increases of 0.1 - 2.1 weaned pigs/litter, and decreases in piglet processing and nursing mortality following implementation of the TAKTIC® treatment program. A theoretical example of the potential for increase return to profit based on these findings is presented.

**Key Words:** TAKTIC®, amitraz, hog mange, *Sarcoptes scabiei* var *suis*.

J. Agric. Entomol. 3(4): 374-381 (October 1986)

Sarcoptic mange is generally recognized by veterinarians and producers as the most important skin disease of swine. Surveys in the leading swine producing states have shown that mange mites or lesions are present in 80 - 90% of swine herds with 20 - 25% of the animals affected (Meleney 1985). Losses caused by this disease in the United States have been estimated at \$30 million annually.

Sarcoptic mange is caused by the invasion of mites, *Sarcoptes scabiei* (DeGeer), which continually burrow through the epidermal skin layers making extensive tunnels where the females lay eggs. This tunneling process causes severe pruritus and the resultant formation of cutaneous lesions. Transmission of mites is by direct contact with lesions forming on any part of the body. First exposure of newborn piglets to mites is from infested sows which may have large numbers of mites in skin crusts on various parts of their body, mainly the inside of the ears.

It is suspected by some producers that chronic mange infestations may reduce the breeding efficiency of boars and sows and increase their susceptibility to other diseases in young animals.

Impaired growth rates and reduced efficiency of feed conversion have been reported in infested animals when compared with those which were uninfested (Cargill and Dobson 1979; Alva-Valdes et al. 1986). Control of this infestation usually results in increased weight gains and feed efficiency (Sheahan et al. 1974).

<sup>1</sup> Accepted for publication 15 January 1987. Fee paid for early publication.

<sup>2</sup> Department of Veterinary Pathology, Purdue University, West Lafayette, IN.

<sup>3</sup> Department of Entomology, North Carolina State University, Raleigh, NC.

<sup>4</sup> Department of Veterinary Extension, University of Nebraska, Lincoln NE.

<sup>5</sup> Department of Entomology, Iowa State University, Ames, IA.

<sup>6</sup> Department of Entomology, Purdue University, West Lafayette, IN.

Similar observations on improvement in weight gains following treatment have been made by many investigators including Mauk and Mickwitz (1965), Hewett and Heard (1982), Hewett (1985), and Vinson (1986).

Control of sarcoptic mange in swine is dependent upon eradication of mites from the skin of infested animals and elimination of any possible introduction of mites into the herd. Control should also be directed towards prevention of transmission of any residual infestation and its subsequent development in susceptible animals. Such programs of treatment and control should be integrated with the routine daily tasks of the producer in order that they may be conducted without an added burden to the normal operation. Several methods of sprays and injections using various compounds have been used in the past (Meleney 1985). None has been completely effective and economical.

The present report describes an integrated program using TAKTIC® to control sarcoptic mange in swine. The report is based on field studies conducted in four states: Indiana, Iowa, Nebraska, and North Carolina.

Amitraz, the active ingredient in TAKTIC®, is a triazapentadiene which has shown high acaricidal activity against various parasitic acari (Harrison et al. 1972; Curtis 1985).

TAKTIC®, a 12.5% emulsifiable concentrate (EC), has been used topically as sprays and dips to control ticks, mites, and lice on livestock in Europe, Australia, and South America but not in the United States (Griffiths 1975; Allan 1978; Harrison 1981). For treatment of sarcoptic mange in pigs, TAKTIC® has been used successfully since 1975 (Griffiths 1975; Johansson et al. 1980).

## MATERIALS AND METHODS

### *Animals*

Animals used in the field trials were swine of various breeds and ages in eight privately owned herds. There were two herds in Indiana, one herd in Iowa, three in Nebraska, and two in North Carolina. The operation of these herds was on a farrow to finish basis with animals mostly housed indoors. The total number of animals within one operation was variable during the trials but the number of sows in each herd was fairly constant. The number of sows in the various herds ranged from 50 in two of the herds in Nebraska to 400 in one of the herds in North Carolina (Table 1).

The swine herds in this study were selected because they had a history of problems with sarcoptic mange during previous years. Some herds had been periodically treated with various chemicals, but no animals were treated for at least 2 months prior to initiation of the present trials.

### *Scrapings*

To determine the incidence of infestation with *S. scabiei* in any of the herds at a certain time, 10-20 animals of various ages were selected for sampling. Each of these animals was properly restrained, and skin scrapings were taken from three locations of the body. Areas about 1 inch long by ½ inch (25.4 × 12.7 mm) wide in the inside of the ear pinna, the back and the rump were scraped until first traces of blood appeared. Scrapings were placed in vials or on glass slides, labelled, transported to the laboratory, and microscopically examined for the presence of mites.

Table 1. Percent infestation levels of *Sarcoptes scabiei* on swine before and after TAKTIC® treatment.

Location	Herd no.	No. of sows in herd*	No. animals scraped	Pretreatment infestation (%)	Posttreatment infestation (%)			
					2 wk	4 wk	8 wk	16 wk
Indiana	1	120	40	30.0	0.0	0.0	5.0	15.0
	2	170	40	15.0	0.0	0.0	0.0	0.0
Iowa	1	110	40	37.5	0.0	0.0	5.0	15.0
Nebraska	1	130	12	50.0	0.0	0.0	0.0	5.0
	2	50	10	100.0	0.0	0.0	0.0	1.3
	3	50	20	35.0	0.0	0.0	0.0	2.5
North Carolina	1	400	20	40.0	0.0	0.0	0.0	0.0
	2	382	40	100.0	0.0	0.0	0.0	0.0

\* Chosen because total swine numbers on farms change constantly.



Scrapings from animals in each herd were examined twice before treatment, 2 wk following treatment and once every month thereafter.

#### *Treatment*

Spray material was prepared from a stock solution containing 12.5% ai TAKTIC®. Before spraying, all feeders and waterers were removed, emptied or tightly covered to prevent contamination. All animals in each herd were initially sprayed with a solution of 0.05% AI in water. A second application of the same concentration of spray was made 7-14 d later. All animals including newborn piglets were thoroughly sprayed until runoff or for 3 min/animal with particular attention being given to the inner surface of the ear pinna, the axillae and groin. Approximately 2 liters of spray material were used on each animal with more solution used on larger sows and boars and less on the smaller animals. The premises, including the walls, pen dividers, and equipment in the pens, were also sprayed. The equipment used for spraying varied between farms. Some used mixing tanks powered by tractors (crop sprayers), others used power cleaning spraying equipment. The spray was applied at pressures varying from 35-150 psi with a coarse nozzle wand spray handle.

Following the two comprehensive sprayings, a maintenance prevention program was instituted in each herd. This program focused on preventing infestation of the young piglets. At weaning and before piglets from various litters were mixed together, they were sprayed thoroughly or dipped in a 0.05% AI solution of TAKTIC®. Boars were also sprayed once every 3 months. New animals to be added to the herd during this study were isolated and sprayed twice (7-10 d apart) before being placed with the rest of the animals. Sows in late pregnancy were sprayed as they were being moved to the farrowing crates.

#### *Procedure*

All trials performed in this study were carried out between May 1984 and August 1985. Spraying or dipping of the animals was performed by the owners. Except for the original two sprayings of all the animals in the herd, the procedure devised for the program was intended to integrate with and be carried out during the times when the animals were being normally handled for other reasons.

Records of production and feed consumption were kept by the owners during the study period. Information on numbers of litters born, number of pigs born alive in each litter and number weaned, birth weight, and weaning weights was recorded. The total number of animals sold and the age at which the animals reached market weight and feed consumption were also recorded during the period of the experiment and compared to those from previous years.

## RESULTS

Following the initial treatment of all the animals in the herd it was noticed that the red or deep pink color of the skin of the white breeds of pigs became subdued. Animals appeared quieter and scratched themselves much less frequently than they did previously. Sows also were quiet and rested more than they did before spraying, giving the piglets more opportunity to nurse. Fewer of these newborn piglets were injured through the movement of their mother. In one of the trials the investigator noted that following treatment with TAKTIC® the skin of the scrotum

of the boars lost its scabby and rough appearance which was previously thought to be the normal appearance of animals raised in confinement on concrete.

The incidence of infestation with mites following treatment was dramatically reduced (Table 1). In some of the herds no mites were observed on the animals following treatment for the total period of the trials. In the trial at Iowa, where a few mites were found on some animals, it was indicated by the owners that they had introduced one or more animals into the herd without spraying them with TAKTIC® as they were advised.

It was noted during pretreatment observations of sows in several of the trials that some had abscesses on their hind legs which was probably due to constant scratching and possible injury. Posttreatment observations at 3 months revealed overall reduced numbers of abscesses and none in some herds.

The data on improvement of performance of the various herds in this study after spraying with TAKTIC® and following the integrated program outlines were quite impressive although variable. Individual animals improved in several qualities such as general appearance and behavior. The skin condition of these animals was better and they were quieter. The owners noticed that they reached market weight and appearance 10-15 d earlier than the previous year. There were large differences in processing mortality of the newborn piglets (24 h mortality), nursing mortality (24 h old to weaning), and total mortality between the data obtained after treatment and the previous year. The economic benefit from using the integrated program in the present study showed the average number of weaned piglets per litter increased by 0.1 to 2.1 piglets. Although several of the owners changed some management and health programs in their herds during the trial period, they were convinced that a large part of the improved performance and decreased piglet mortality was due to the improved vigor of these young animals. The incidences of exudative dermatitis, "greasy pig disease," in most of the herds were dramatically reduced or completely eliminated. Data from three herds, one each from Indiana, Nebraska, and North Carolina are outlined in Table 2.

Table 2. Performance of three swine herds treated with TAKTIC® in an integrated use program.

Location	Average no. pigs farrowed/sow		Average no. pigs weaned/sow	
	Pretreatment	Posttreatment	Pretreatment	Posttreatment
Indiana	10.21	10.28	6.95	9.08
Nebraska	10.30	10.10	9.20	9.30
North Carolina	10.28	9.86	7.75	8.03

The profits from using the integrated program varied considerably between farms because the data varied according to the cost of feed, total number of animals, wages for employees, market price of swine at different times of the year and many other factors. The annual increased profit which may occur in a herd of 100 sows under average conditions is demonstrated when a good management control program is used (Table 3). The cost of treatment with TAKTIC® was also



Table 3. Value of annual profit increase in a 100 sow herd treated with TAKTIC® in an integrated program to control sarcoptic mange.

Production parameter	Amount (\$)
12 lb./pig increased weight at market time for 1850 pigs or saving \$1.54/CWT of pig	\$2,849.00
0.1 lb. decrease in feed/grain	2,030.00
0.6 extra pig/litter weaned	2,323.00
48 saleable breeding gilts @ \$25.00 over slaughter market price	1,200.00
Subtotal	8,402.00
Minus cost of initial treatment medication	324.00
Subtotal	8,078.00
Minus cost of maintenance program	270.00
Total return to profit	\$7,808.00

variable between farms because of different labor costs. The price of the medication, however, is fairly constant and spraying a sow twice for the initial treatment using 2 quarts (1.892 liters) of the 0.05% AI TAKTIC® is about \$0.54. Smaller animals require less of the spray material. Other expenses of the spray of other animals during the program are about \$0.27 or less each spraying. Dipping the piglets is much less. No posttreatment toxicosis signs were noticed in any treated animals including the very young piglets and the sows in late stages of pregnancy.

## DISCUSSION

In the present study, the incidence of sarcoptic mange in swine varied from 15 - 100% of all the animals in a herd. These data confirm the findings of other investigators in the United States and other countries (Sheahan 1970; Meleney 1985). Treating infected animals improved their rate of gain and their productivity (Sheahan 1974). The present investigations, however, showed that increased numbers of weaned pigs per litter can also result from closely following an integrated and strategically directed program of treatment and maintenance.

The data also show that the most common location of the mites on the animals is the inside of the ear pinnae where they cause the formation of severe thick crusts. These mites are usually the source of infestation of newborn animals. Dipping the animals at weaning in a solution of 0.05% ai TAKTIC® ensures their freedom from mites until market weight is reached. Spraying of the pregnant sow before farrowing ensures her freedom from mites at the time when her piglets are in close contact and are most susceptible to infestation. Elimination of mites from the growing pigs and from the sows renders them quieter in disposition and thus

reduces the amount of destruction of equipment and mortality in newborn piglets.

Although the economic improvements and increase in production of the herds following treatment against sarcoptic mange were dramatic, such increased profits could also be the combination of several factors including the control of mange. It is probable that the attention of the owners was directed towards the general area of improved management, hygiene, and sanitation while eliminating the mange problem.

## SUMMARY AND CONCLUSIONS

The use of TAKTIC® in an integrated program for control of sarcoptic mange in swine is very effective when followed strictly and continually. The program is composed of an initial treatment and a maintenance schedule.

### *Initial Treatment*

1. Remove or empty all feeders and waterers from pens if animals are to be sprayed there.
2. All the animals in the herd should be completely and thoroughly sprayed twice with a 0.05% AI mixture of TAKTIC® in water with 7 - 14 d between the sprayings.
3. The inside of the ear pinna (flap) should be carefully sprayed.
4. A coarse spray with at least 35 psi nozzle pressure should be used to ensure that the material reaches the skin surface.
5. Spray all floors, walls and equipment surfaces which come in contact with the animals.

### *Maintenance Program*

1. Spray thoroughly or dip piglets at weaning. Also spray the sow at that time.
2. Spray gestating sows as they are being placed in the farrowing crates. (Sows must be thoroughly sprayed, 100% body coverage).
3. Spray boars every 3 months.
4. Isolate any new additions to the herd and spray twice with 7 - 14 d intervals before they are co-mingled with the rest of the animals.
5. There is a 1 d withholding period between spraying and marketing.

## ACKNOWLEDGMENTS

The authors wish to express acknowledgment to the following people for their contributions: S. M. Stringham, Area IPM Agent, North Carolina State University, Raleigh, NC; D. Busby, Area Agent, Iowa State University, Oakland, IA; and Dr. Bruce Van Zee, DVM, Riverside Animal Hospital, Oakland, IA.

## REFERENCES CITED

- Allan, K. 1978. The ixodiadial efficacy of a number of pour-on formulations of Amitraz against the biavia strain of the Southern cattle tick, *Boophilus microplus*, on house calves. pp. 214-218. In Proc. Conf. Tick-borne Diseases and Their Vectors. Edinburgh. 1976.

- Alva-Valdes, R., D. H. Wallace, A. G. Foster, G. F. Ericsson, and J. W. Wooden. 1986. The effects of sarcoptic mange on the productivity of confined pigs. *Vet. Med. (Food Animals)*. pp. 258-262.
- Cargill, C. F., and K. J. Dobson. 1979. Experimental *Sarcoptes scabiei* infestations in pigs: 2. Effects on production. *Vet. Rec.* 104: 33-36.
- Curtis, R. J. 1985. Amitraz in the control of non-ixodid ectoparasites of livestock. *Vet. Per.* 18: 251-264.
- Griffiths, A. J. 1975. Amitraz for the control of animal ectoparasites with particular reference to sheep tick (*Ixodes ricinus*) and pig mange (*Sarcoptes scabiei*). *Proc. 8th Brit. Insecticide and Fungicide Conf.* pp. 557-563.
- Harrison, I. R. 1981. Recent research on the use of Amitraz for the control of ticks on animals. *Proc. Int. Conf. Tick Biol. Cont.* pp. 123-127.
- Harrison, I. R., A. Kozlik, J. F. McCarthy, B. H. Palmer, S. B. Wakerley, T. J. Watkins, and D. M. Weighton. 1972. 1,5-D, (2,4-Dimethylphenyl) - 3-methyl. 1,3,5 triazapenta - 1,4-dien, a new acaricide active against strains of mites resistant to organophosphorus and bridged diphenyl compounds. *Pestic. Sci.* 3: 679-680.
- Hewett, G. R., and T. W. Heard. 1982. Phosmet for the systemic control of pig mange. *Vet. Rec.* 111: 558.
- Hewett, G. R. 1985. Phosmet for the systemic control of pig mange in growing pigs. *Vet. Par.* 18: 265-268.
- Johansson, L. E., O. Nelsson, and O. Olevall. 1980. Amitraz (TAKTIC®) for the control of pig mange. *Nord. Vet. Med.* 32: 161-164.
- Mauk, C., and C. Mickwitz. 1965. Neguvon treatment of mange and helminth infections in weaned piglets. *Ot. tieraztl. Wschr.* 72: 521-525.
- Meleney, W. P. 1985. Mange Mites and Other Parasitic Mites. In S. M. Gaafar, W. E. Howard, and R. E. Marsh [eds.], *Parasites, Pests and Predators*. World Animal Science B Disciplinary Approach Elsevier Science Publishers, B.V., Amsterdam.
- Sheahan, B. J. 1970. Sarcoptic mange in Irish pigs: A survey. *Irish Vet. J.* 24: 201-203.
- Sheahan, B. J. 1974. Improved weight gains in pigs following treatment for sarcoptic mange. *The Veterinary Record*. August 24: 169-170.
- Vinson, R. 1986. Economics of mange eradication. p. 370. *Proc. 9th Int. Pig Vet. Congress*, Barcelona, Spain.
- Watkins, R. 1978. Low conception traced to Epy. *National Hog Farmer*, Dec. 1978.
-