VETERINAARIA

PIG MANGE CONTROL WITH DIFFERENT LOCAL PREPARATIONS

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The frequency of sarcoptic mange caused by *Sarcoptes suis* in pigs has increased on pig farms in Estonia (Kaarma, Mägi, 1994, 1995). In our conditions determination of the incidence on the farm is possible for 25...35 % of the pigs.

Sarcoptic mange in breeding swine is recognised as a major contributor to losses in swine productivity (Fanneau de la Horie, 1990). In the United States economic losses due to mange mites are 30...240 million dollars (Hogg, 1989). The incidence of mange in the USA is 22...25 %, in Switzerland 10...11 % and in Belgium up to 24 % (Hollanders, Castryck, 1988).

The realisation that arthropod moulting and metamorphosis are controlled by juvenile hormones led researches to suggest that such chemicals might be used both against plant pests and animal parasites (Robbins, 1972; Connat, 1988; Dryden, Neal, Bennette, 1989). As the naturally occurring juvenile hormones are unstable compounds in the environment, hundreds of synthetic preparations are prepared in several countries. To control pest arthropods, about 500 juvenoids have been prepared at the Estonian Institute of Chemistry at the Academy of Sciences. Some compounds which have been reported to have juvenile hormone effects in some insect species were applied in our tests.

Further investigations were made to measure the effect of some plants containing antiparasitic substances. It is wellknown that pesticide application may have a negative impact on the environment, and pest resistance to pesticides can develop after repeated applications. Thus plant components may play a major role.

Plants might have developed chemical protection, based upon anti-hormonal compounds (Bowers et al., 1976). The compounds were extracted from the common plant *Ageratum houstonianum* and identified as precocene. Certain natural pesticides have been extracted from the neem tree and other tropical plants (Schmutter, Ascher, 1986) as well as from several local plants in Estonia (Metspalu, Hiiesaar, 1992).

Material and methods

From 1990...1995 several experiments with local preparations were carried out on the experimental pig unit in Ilmatsalu (Tartu district). To control swine sarcoptosis, our investigations were made to determine the effect of the chemotherapeutic preparation benzyl benzoate, 5 juvenoids and 4 plant extracts.

Industrial benzyl benzoate is an inexpensive chemotherapeutic acaricide, produced in the Estonian Oil-Shale Combine in Kohtla-Järve as a byproduct in the oil production process. Our experiments were carried out with 5...40 % water emulsions of unrefined benzyl benzoate.

Plants used in our trials were: cow parsley (*Heracleum sosnowskyi*), mugwort (*Artemisia vulgaris*), tansy (*Tanacetum vulgare*) and wormwood (Artemisia absinthum). Several parts of plants as seeds, leaves or flowers were infused in 70° spirit solutions for 24...48 hours. All experiments were carried out with 5...10 % plant extract water solutions.

About 250 pigs showing clinical signs of mange were used in our trials. The basic dosage used contained 1...1.5 g of active product per 100 g of water. Clinical evaluations were made up to 45 days after treatment. Pigs were treated with pneumatic sprayer OP-12 twice, with a week interval, and observations continued up to 6 weeks after the treatment.

Results

According to our results, great improvement was noticed two weeks after treatment with juvenoids and benzyl benzoate (table 1). In the first post-treatment examination, the number of mites were significantly lower in scrapings from treated pigs. The most active compounds were the juvenoids efoksen and efoksen P. After 2...3 weeks only 1...2 % of live mites were found on the treated animals. Preparations 3434 E and T-634 inhibited oviposition and were lethal to mange mites. The application of efotrin and efoksen P typically disrupts the development of parasites. All the juvenile preparatons used in our experimental work had no morphogenetic effects. Our results led to the suggestion that such chemicals might be used against external parasites.

Table 1. Effects of juvenile preparations and benzyle benzoate against sarcoptic mange mites Sarcoptes Suis

Variants	Parasitic stage	Number of pigs	Number of parasites after treatment (% of initial infestation level)			
			1 week	2 weeks	3 weeks	4 weeks
Efoksen 2%	Imago	16	27.940	26.160	2.2800	0.9360
Nontreated	"	16	97.520	104.200	104.360	103.540
(control)			P=0.0119	P=0.2404	P=0.0212	P=0.0000
Efoksen P 1%	Imago	15	14.200	5.420	1.900	0.260
Nontreated	"	16	97.520	104.200	104.360	103.540
(control)			P=0.4520	P=0.0679	P=0.0290	P=0.000
T-634 2%	Imago	15	21.840	10.320	3.400	2.060
Nontreated	"	16	97.520	104.360	104.360	103.540
(control)			P=0.3831	P=0.0118	P=0.0051	P=0.0003
Efotrin 25%	Imago	15	67.540	53.280	6.880	3.4450
Nontreated	"	16	97.520	104.200	104.360	103.540
(control)			P=0.966	P=0.971	P=0.1162	P=0.0124
Benzyl benzoate 10%	Imago	10	16.200	3.120	0.000	0.000
Nontreated	"	16	9752	104.200	104.360	103.540
(control)			P=0.0115	P=0.0012	–	–

The high efficacy of a 10 % emulsion of benzyl benzoate was demonstrated in our tests (Table 1). According to our observations 10 % industrial benzyl benzoate killed all adult mites within 3 weeks after the treatment.

Spraying with extract of cow parsley proved to be effective against sarcoptic mange of pigs. 10 % extract of seeds affected the reproduction ability of the parasites: 80 % of the mites died due to antijuvenile compounds within four weeks. High larval mortality and morphological deformations were observed in scabs. The extracts of tancy and wormwood were also lethal for mange mites. Application of these extracts could diminish the number of parasites by up to 60 % in 4 weeks. The dilutions of mugwort proved to be less effective against mites but they significantly reduced the clinical symptoms of sarcoptic mange.

The One Way AOV (one-way analysis of variance) was used to test the hypotheses. Comparisons of means were used to compare the means of the different groups. The results of our tests are displayed below (Table 2).

Table 2. Pairwise comparisons of means (4 weeks after pig treatments)

Variants	Parasitic stage	Number of parasites (% of initial infestation level)	Homogenous groups		
Control	imago	103.540	I		
Mugwort	"	18.220	I		
Cow parsley	"	10.940		I	I
Wormwood	"	10.780		I	I
Tansy	"	8.580		I	I
3434 E	"	4.780			I
Efoksen P+D*	"	2.220			I
T-634+D*	"	2.180			I
3434 E+D*	"	2.100			I
T-634	"	2.060			I
Stomozan 0.5 %	"	1.820			I
Efoksen	"	0.930			I
Efoksen P	"	0.260			I
Efoksen +D*	"	0.001			I
Benzyl benzoate	"	0.000			I

D* = dimethylsulphoxid
Control = nontreated group
Critical t-value = 3.696
Critical value for comparison = 11.976
Rejection level = 0.005

The columns under the heading "Homogenous groups" indicate which means are not significantly different from one another. There are 3 columns according to our results because there are 3 groups of similar means. The first group contains the means of the control variant, the second group contains the means for the plant extracts and the third group contains the means for the tested juvenile hormone preparations, stomozan and benzyl benzoate.

Conclusions

The general conclusions, reached according to the results of observations in 5 successive years on the pig farm trials, are as follows:

Our studies paved the way for future successful control measures employing juvenoids and other domestic pesticides against sarcoptic mange in pigs.

According to our data, the most beneficial preparations for industrial production are efoksen and benzyl benzoate.

To control mange mites, preparations containing dimethylsulphoxid are of high efficacy.

The extracts of local plants containing insect reproductive suppressors require more attention and further investigation.

Literature

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Sigade sarkoptoosi tõrjest mõningate kohalike preparaatidega

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Kokkuvõte

Sigade sarkoptoosi tõrjekatsed viidi läbi Tartu maakonnas Ilmatsalu seafarmis. Aastatel 1990...1995 kontrolliti Eesti TA Keemia Instituudis sünteesitud 5 juvenoidpreparaati, 4 kohaliku päritoluga taimeekstrakti ja tööstuslikku bensüülbensoaati, mida saadakse põlevkivi töötlemisel vaheproduktina.

Katsetatud preparaatidest moodustus tulemuste analüüsimisel ühiste tunnuste alusel 3 homogeenset rühma, kusjuures kõik erinesid oluliselt töötlemata kontrollvariandist. Kõige efektiivsemateks osutusid 10 %-line bensüülbensoaadi vesiemulsioon ja dimetüülsulfoksiidi lisandiga 2 %-lised juvenoidpreparaadid. Viimased kuulusid ühtsesse homogeensesse rühma 0,5 %-lise stomosaani standardlahusega. Antijuveniilsed ühendid ja fütoinsektitsiide sisaldavad taimeekstraktid osutusid samuti perspektiivseteks antiparasitaarseteks vahenditeks sigade sarkoptoosi tõrjel.