

VOLCK OIL, SPECIAL EMULSION NUMBER TWO,  
AS AN ANIMAL INSECTICIDE

by

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## INTRODUCTION

The efficiency of Volck oil as an insecticide and ovicide against certain insect pests led the manufacturers to believe that the material might prove to be effective against external insect parasites of man and animals. Accordingly the problem of determining this efficiency was begun at the Kansas State Agricultural College, Department of Entomology, June 1, 1927, by Mr. W. G. Bruce\*. This work was carried on through the administration of the Crop Protection Institute. The present paper is based upon the experiments carried on through the past winter as a continuation of this project.

## MATERIAL USED

The material used throughout this set of experiments was Volck Oil, Special Emulsion No. 2. This oil differs from other Volck oils only in the type of emulsifying agent used.

The undiluted oil is white, has the consistency of heavy cream, is almost odorless, and has a slight acid

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\*Bruce, W. G.

1928. The Use of Volck Against External Parasites of Domestic Animals.  
Kansas Entomological Soc., 1:74-79.

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taste. It goes into solution readily with hard or soft, cold or warm water. In solutions of high dilution it separates very quickly. A five per cent emulsion will separate within a few days and emulsions of higher concentration will last somewhat longer.

### EFFECT OF THE OIL UPON ANIMALS

Emulsions of this oil varying from 4.5 to 100 per cent have been used externally upon over three-hundred animals without apparent signs of ill effects.

In every case treated, the oil gave a smooth, glossy coat of hair, a better skin texture, and a finer general appearance. Most highly refined petroleum oils have this effect upon skin and hair.

Volck oil taken internally in normal doses is practically harmless. Many animals have been observed taking it into their systems, and none have shown ill effects. Large dosages of the oil might cause a certain amount of damage to the animal.

A one-hundred-fifty pound hog was given a six-ounce dose of 100 per cent Volck by means of a stomach tube. The temperature of the animal had risen from 102 degrees to 103 degrees the following day. On the third day after

the dose was given, the temperature of the animal had returned to normal. Outside of a slight laxative effect, the animal showed no external symptoms.

Four days after the first dose of Volck had been administered to the hog, a 12-ounce dose of 100 per cent oil was administered to the animal by stomach tube. Five hours later, its temperature had risen to 105 degrees, returning to normal on the third day after the treatment. The animal again showed but slight external symptoms.

The hog was killed five days after the second treatment and post-mortem showed a severe gastritis of the stomach, which was due very probably to the action of the oil. The animal would have been able to throw off these ill effects.

#### EFFECT OF THE OIL UPON EXTERNAL INSECT PARASITES

The rapidity of the killing power of this oil is almost phenomenal. An insect to which it is applied usually dies within a relatively short period of time, 30 minutes.

It has been advanced that oils such as this kill insects to which it is applied by stoppage of the spiracles thereby causing suffocation. It is not probable that suffocation could kill an insect so rapidly as this oil

usually does, and it is felt that some other mechanism or combination of mechanisms will be found to produce the result.

#### METHODS USED TO APPLY THE OIL

All but six applications of the oil were made by dipping or by spraying. In most cases, the animal being treated was worked over until every part of its body was entirely covered with the oil.

A few large animals were sprayed with a five gallon force pump sprayer. These animals were sprayed until the oil had penetrated to most parts of the body surface.

The majority of the animals treated were dipped into a large barrel or drum. The emulsion placed in this container was ample to allow a complete coverage to the animal being dipped.

## DEMODECTIC MANGE OF THE DOG

(Demodex canis)

Three dogs upon which the mite Demodex canis had become pathological were treated with three dilutions of Volck oil. But one of these cases was carried to completion. The other two dogs were brought into the Clinic for treatment by private owners and after several applications of the oil had given no evident results for the betterment of the mange, the oil treatments were discontinued.

A seven months old Boston terrier bitch infected with Demodex was secured. The skin of this animal was very heavily infested with mites. About one-fourth the total surface area was denuded of hair and these bare spots were covered with skin lesions and pustules. The dog presented a well advanced case of demodectic or red mange of canines. Microscopic examination proved the mite to be present in abundance. The owner of the dog stated that the animal had been noticeably affected for several months previous to the first oil treatment.

Before each application of Volck the dog was thoroughly washed with warm water and soap. The scabs were removed with a stiff bristled brush after they were sufficiently softened by the warm water. The pustules were opened and their contents were removed wherever this was possible. All the applications of oil were made at approximately body temperature and as much care as possible was taken to prevent the animal from chilling after the oil had been applied.

Four applications of 25 per cent Volck were made upon the dog the first two applications being seven days apart; the final two being three days apart. These four treatments were followed by four applications of 100 per cent Volck, each treatment being three days apart.

Immediately following the first and second treatment of the oil, a slight improvement was noticed in the conditions of the skin lesions and pustules. A few of these which were not extensive had the appearance of healing. This effect was lost in each case on about the third day. Thereafter, no results for the betterment of the case were secured.

Following the eight applications of straight Volck, a mixture of Volck and Derrisine powder was applied to the



animal in two treatments, these being each three days apart. This material was in the proportion of one-fourth pound of the powder to one gallon of 90 per cent Volck. The combination was rubbed over the entire body of the dog. This combination did not give satisfactory results in the control of the mange and was seemingly toxic to the dog. She became extremely nervous, lacked appetite, was hardly able to stand, shook continually, and her eyes were matted shut for several days at a time.

After four applications of 25 per cent Volck, four applications of 100 per cent Volck and two applications of a mixture composed of one-fourth pound of Derrisine powder mixed into one gallon of 90 per cent Volck oil, the case was totally unimproved, and was turned over to the Veterinary Clinic Department for proper disposal after microscopic examination had proved the mites to be still abundant.

Volck oil in the dilutions used showed no demonstrable beneficial effects upon this case of demodectic or red mange of the dog.

## THE COMMON DOG AND CAT FLEA

(Ctenocephalis canis)

Four dogs and two cats infested with the common flea of the dog and cat were dipped into several dilutions of Volck. Each animal was held in the dipping solution for about ten minutes in order that the oil might have a complete action upon the parasites.

A dog was dipped into a four per cent emulsion of Volck. This gave but a very incomplete kill of the fleas. Four fleas were removed from the animal after dipping and were kept under observation. Three of these recovered.

One dog and one cat were dipped into a five per cent emulsion of Volck, this resulting in a fair control of the fleas. Ten fleas were removed from the cat after it had been in the oil for three minutes and six of these recovered. Five fleas were removed from the dog after it had been in the oil for five minutes and three recovered. A few fleas were found upon both animals when they were inspected 24 hours later.

Two dogs and one cat were dipped in a six per cent emulsion of Volck. This dilution of the oil resulted in a practical control of the fleas. One dog was inspected

24 hours after the application of the oil and two live fleas were found upon it. Four fleas were found upon the other dog 24 hours after the application. No fleas were found upon the cat until three days after it had been dipped.

No apparent repellent effects are exhibited by the oil under the conditions in which it was used, and it is therefore difficult to draw conclusions upon its efficiency to rid an animal of fleas. The oil seems to be effective as an insecticide upon the flea only so long as it is able to spread to the flea from the hair of the animal to which it is applied. Those fleas which return to the animal after the oil has become partially or wholly dry are probably not affected by it.

#### THE BITING DOG LOUSE

(Trichodectes latus)

Two dogs infested with the biting dog louse were treated with Volck oil in five and seven per cent emulsions. Both dilutions gave a satisfactory control of the nymphal and adult lice upon the animals.

The dog which was dipped in a five per cent emulsion was reinfested with nymphs a few days after the treatment.

Because the animal was isolated from others, this reinfestation probably came from eggs hatching upon its body. The dog was redipped in a five per cent emulsion upon the fifteenth day after the first application.

These two applications of five per cent Volck oil applied 15 days apart resulted in a practical control of the louse infestation on this animal. It was examined almost daily for 15 days after the second treatment, but no nymphs or adult lice were found upon it.

The dog which was dipped in a seven per cent Volck also became reinfested with nymphal lice but was not redipped. Twenty-six days after the single application of oil the infestation had reached approximately 75 per cent of what it had been before the treatment of oil.

#### THE BITING HORSE LOUSE

(Trichodectes equi)

Volck oil in a six per cent emulsion applied to one horse killed all the nymphal and adult lice upon the animal. A number of these were placed in a container and were kept under observation for a number of hours. None of these recovered. A few live lice were found upon

the animal several hours after the application. None but dead lice were found the day following.

Eight days after the application, nymphs began to appear, these hatching from eggs upon the animal. When last seen 21 days after the single treatment, the horse was again infested with lice. The exact proportion of eggs that hatched upon the animal after the application of the oil cannot be stated. The subsequent infestation was not as heavy as the first, though lice could be found over most of the horse.

#### THE HOG LOUSE (Haematopinis suis)

Two-hundred-twenty shoats and hogs were divided into 14 experimental lots and were either dipped or sprayed with emulsions of Volck oil, the strength of which varied from four to twelve per cent. The results secured from these experiments are as follows:

Five small pigs were dipped and one sow was sprayed with a four per cent emulsion. Upon the following day, these showed that the majority of the lice upon these animals were not affected by the oil at this strength.

Ten small pigs were dipped and two sows were sprayed with a five per cent emulsion. A number of live lice were found upon all of these animals the day following the application.

The 37 small pigs and the six sows which were dipped or sprayed with emulsions of seven, nine and twelve per cents showed no infestation of lice the day following the application of the oil.

A check taken the third day after the application of the oil showed the presence of a few lice upon all the sows which had been sprayed. It was decided that the spray had not been applied effectively. A further check taken nine days after the treatment showed that eggs were hatching on all the sows.

Because of the differences secured with the five and seven per cent emulsions, 49 pigs were dipped into a six per cent Volck. The check taken during the following five days showed that Volck oil in a six per cent emulsion was as effective in the control of the adult hog louse as those emulsions of higher concentration.

Consequently, 15 days after the first application of the oil, all the pigs which have been treated were again dipped or sprayed. In addition to these, 38 pigs were sprayed with a ten per cent emulsion.



Three days after this treatment, 47 of the smaller pigs were dead. Post mortem examinations made by the Clinic Department of the Veterinary College showed coleric lesions as well as some pneumonic symptoms. This mishap broke up the major part of the first set of experiments.

Fifty-five hogs were sprayed with Volck oil in dilutions which varied from five to twelve per cent. Unfavorable results were secured from these applications because of the inaccessible locations assumed by the lice upon the host such as in the ears and in the deep crevices about the legs. A number of live lice were found upon most of the sprayed hogs a few days following the application of the oil.

One pig which was very heavily infested with hog lice was thrown and sprayed with a six per cent emulsion, care being taken to force the spray into those parts of the animal's body in which it was thought certain lice might escape the oil. This type of application gave a satisfactory control on the lice upon this animal.

It is not possible to estimate the percentage of eggs which are killed by the effects of the oil. In none of the experiments made with the oil in dilutions up to 12 per cent has the oil proved efficient as an ovicide, the nymphs usually appearing between the third and fifth day.

The herd was inspected April 15, about six months after the treatment of Volck, and a few lice were found upon a few animals. Seven lice were found on one pig, two upon another, and none on nine.

Since the herd had been thrown together during the winter months and because several sows and three boars that had been sprayed but once were included with the others, it is felt that the subsequent infestation came from these other animals and not from the hogs within the herd that had been given two treatments of six per cent Volck.

#### HOG MANGE

(Sarcoptes scabiei var suis)

Sixty-eight pigs infested with the mange mite of swine were divided into three experimental lots and were dipped into Volck oil emulsions of 5, 10 and 20 per cents.

All the checks upon these animals were made upon those pigs which had been dipped in 20 per cent Volck, the attitude taken being that if a control was effected at this strength, additional checks could be taken upon those pigs which were dipped into emulsions of lesser concentration.



Volck oil in emulsions up to 20 per cent showed no beneficial effects in the control of the mange of hogs, in a single application.

#### VOLCK OIL AS A HAIR DRESSING

Volck oil in a five per cent emulsion was brushed into the hair of 20 steers and one heifer which were being conditioned for the show ring. In every case the oil yielded a smooth and shining coat of hair and left the animal in good show condition. In no case were any ill effects noticed which resulted from the use of the oil.

Volck oil in a 50 per cent emulsion to which was added several drops of perfume, has been used by two men for several months, as a hair dressing. The author has used a 100 per cent Volck as a hair dressing for nine months. No ill effects have been noticed from the use of the oil, and it is a very satisfactory hair dressing.

#### THE TROPICAL FOWL MITE

(Liponyssus bursa)

Four birds which were infested with the tropical fowl mite were dipped into Volck oil of five and ten per cent emulsions. The following day, no live mites were found upon these chickens.

## DISCUSSION

The oil is seemingly effective in killing nymphal and adult lice upon domestic animals. In every case where an infested animal was treated with an emulsion of proper strength, most of the parasites were dead within a few hours and usually the remainder were gone the day following. This was quite misleading for all these animals became reinfested later.

When the later infestations were first noticed, it was thought that a few adults had escaped the action of the oil through unsatisfactory application. This was possibly true in a few cases, but subsequent work showed that the oil in percentages of 12 and less did not effect the eggs of the parasite to any great extent.

Two applications of Volck at six per cent used as a dip gave a very satisfactory control of lice. The second application was made after all the eggs of the parasites had hatched, and before the nymphal females became mature.

No conclusions have been reached as to the effect of Volck oil in the control of mange. Additional cases of demodectic mange may show that the oil is effective in the treatment of the mange with certain dogs and not in other

dogs. More than one application of Volck oil may prove to be effective in the control of swine mange.

It is probable that the oil will be found to be very effective in most cases where the parasite has no egg stage upon the host. One application in the proper dilution should give almost a complete control. Where the parasite has an egg stage upon the host, it is believed that two applications will be necessary to rid the animal of the parasites.

#### CONCLUSIONS

1. Volck Oil Special Emulsion No. 2, in proper dilution is effective in a single application when in contact with those external insect parasites which have no egg stage upon the host.

2. Two applications of Volck oil in proper dilution is necessary to control those external insect parasites of animals when these have an egg stage upon the host.

3. The oil is not effective as an ovicide in dilutions of 12 per cent and less.

4. The oil is harmless to animals when used externally, and is harmless to animals when used internally in normal doses.

5. When used as a hair dressing, Volck oil acts favorably upon the skin and hair of animals.

## ACKNOWLEDGMENTS

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## SUMMARY OF EXPERIMENTS WITH VOLCK OIL SPECIAL EMULSION NO. 2

Parasite	Host	Number	Per cent	Methods	Date	Temp.	R.H.	24 Hr. Ck.	5 Day Ck.	Final Check
D. canis	Dog	1	50	Dip	9 IX '28	69°	50	No result		
			100	Hand appl	13 IX '28	50°	100	No result	No result	No result
D. canis	Dog	1	25	Dip	16 X '28			Slight Imp.	Imp. gone	
	Dog		25	Dip	23 X '28			Slight Imp.	Imp. gone	
	Dog		25	Dip	30 X '28			No improvement		
	Dog		25	Dip	3 XI '28			No improvement		
	Dog		100	Hand appl	8 XI '28			No improvement		
	Dog		100	Hand appl	11 XI '28			No improvement		
	Dog		100	Hand appl	14 XI '28			No improvement		
	Dog		100	Hand appl	17 XI '28			No improvement		
	Dog		*	Hand appl	23 XI '28			Animal ill	ill	
	Dog		*	Hand appl	26 XI '28			Animal ill	ill	No beneficial result
Cten. canis	Dog	1	4	Dip	9 X '28	69°	50	Poor control	Fleas present	
Cten. canis	Dog	1	5	Dip	26 IX '28	55°	52	Fair control	Fleas present	
Cten. canis	Cat	1	5	Dip	27 X '28	65°	75	Fair control	Fleas present	
Cten. canis	Dog	1	6	Dip	16 IX '28	65°	82	Good control	Few fleas present	
Cten. canis	Dog	1	6	Dip	30 XI '28	39°		Good control	Few fleas present	
Cten. canis	Dog	1	6	Dip	30 XI '28	39°		Good control	Few fleas present	
Trich. latus	Dog	1	5	Dip	10 X '28	81°	72	Good control	Nymphs found	Redipped
			5	Redipped	25 X '28	52°	75	Good control	No nymphs	Excellent Cont.
Trich. latus	Dog	1	7	Dip	3 I '29	31°		Good control	Nymphs found	Reinfested
Trich. equi	Horse	1	6	Spray	10 XI '29	16°		Good control	Nymphs found	Reinfested
L. Bursa	Chicken	3	5	Dip	12 V '29	72°		Good control		
L. bursa	Chicken	1	10	Dip	12 V '29	72°		Good control		
Haem. suis	Hog	5	4	Dip	15 X '28	74°	88	Poor control	Lice found	Redipped
		10	5	Dip	15 X '28	74°	88	Fair control	Lice found	Redipped
		12	7	Dip	15 X '28	74°	88	Good control	A few lice found	Redipped
		12	9	Dip	15 X '28	74°	88	Good control	A few lice found	Redipped
		13	12	Dip	15 X '28	74°	88	Good control	A few lice found	Redipped
	2 sows	4	Spray	15 X '28	74°	88	Poor control	Lice found	Resprayed	
	2 sows	5	Spray	15 X '28	74°	88	Poor control	Lice found	Resprayed	
	2 sows	7	Spray	15 X '28	74°	88	Fair control	Lice found	Resprayed	
	2 sows	9	Spray	15 X '28	74°	88	Fair control	Lice found	Resprayed	
	2 sows	12	Spray	15 X '28	74°	88	Fair control	Lice found	Resprayed	
	13 sows	12	Spray	15 X '28	74°	88	Fair control	Lice found	Resprayed	
	49 pigs	6	Dip	27 X '28	48°	75	Good control	Few lice found	Few lice found	
	62 pigs	6	Redipped	27 X '28	48°	75	Good control	No lice found	Excellent cont.	
	10 sows	6	Resprayed	27 X '28	48°	75	Fair control	No lice found	Few lice found	
	1 pig	6	Spray	1 XI '28			Good control	No lice found	Few lice found	
Sarcoptes scabiei	Hog	28	5	Dip	26 IX '28	75°		No result	No result	
		26	10	Dip	26 IX '28	75°		No result	No result	
var. suis		14	20	Dip	26 IX '28	75°		No result	No result	

' Relative humidity. \*One-fourth pound Derrisine powder into one gallon of 90 per cent Volck.