COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952-1973

APPLICATION FOR A PATENT

I/We COOPERS ANIMAL HEALTH LIMITED

of Berkhamsted Hill, Berkhamsted, Hertfordshire, ENGLAND

hereby apply for the grant of a Patent for an invention entitled:

LIQUID FORMULATIONS

which is described in the accompanying complete specification. This Application is a Convention Application and is based on the Application(s) numbered: 8613914 for a Patent or similar protection made in United Kingdom on 7 June 1986.

My/Our address for service is:

GRiffith Hassel & Frazer
71 York Street
Sydney N.S.W. 2000
Australia

DATED this 5th day of June, 1987.

COOPERS ANIMAL HEALTH LIMITED

By his/their Patent Attorneys

TO: THE COMMISSIONER OF PATENTS
COMMONWEALTH OF AUSTRALIA

Sydney
ASSIGNEE - APPLICANT

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952 (AS AMENDED)

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

In support of an Application made by: COOPERS ANIMAL HEALTH LIMITED

for a patent for an invention entitled: Liquid Formulations

full name of I, LAURENCE DAVID JENKINS

of Langley Court, Beckenham, Kent, England

do solemnly and sincerely declare as follows:

1. I am authorised by the above mentioned applicant for the patent to make this Declaration on its behalf.

2. The name and address of each actual inventor of the invention is as follows:

IVOR PHILIP BAKER, of Coopers Animal Health Limited, of Berkhamsted Hill, Berkhamsted, Hertfordshire, England

and the fact(s) upon which the applicant is entitled to make this application are as follows: The applicant is entitled to have a patent on the application assigned to him by virtue of the terms of the inventors employment by the applicant

3. The basic application(s) as defined by Section 141 of the Act was(were) made as follows:

Country United Kingdom on 7th June 1986

in the name(s) COOPERS ANIMAL HEALTH LIMITED

and in

in the name(s)

and in

in the name(s)

4. The basic application(s) referred to in the preceding paragraph of this Declaration was(were) the first application(s) made in a Convention country in respect of the invention the subject of this application.

Beckenham, Kent, declared at England this 19th day of May 1987

Signed: GRIFFITH HASSEL & FRAZER, P.O. BOX 2133, G.P.O., SYDNEY, N.S.W. 2001

Position: AUSTRALIA
It has now been found that a particular solvent system has the combined properties of low irritancy and appropriate solvency and is particularly suitable for use in formulations for localised topical application.

Claim

1. A pour-on formulation comprising one or more ectoparasiticides in a solvent system comprising 80 to 98% w/v of a fixed oil and 2 to 20% w/v of a volatile silicone.

2. A pour-on formulation according to claim 1 wherein the fixed oil is selected from arachis, castor, maize, olive, rape and soya oils.

4. A pour-on formulation according to any one of claims 1 to 3 wherein the ectoparasiticides are selected from pyrethrins, pyrethroids, car bamates, water-insoluble organo-phosphorous compounds, benzoyl ureas, formamidines, triazines, avermectins and milbemycins.
COMMONWEALTH OF AUSTRALIA
PATENTS ACT 1952

COMPLETE SPECIFICATION
FOR OFFICE USE

Short Title:

Int. Cl:

Application Number:
Lodged:

Complete Specification—Lodged:
Accepted:
Lapsed:
Published:

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: COOPERS ANIMAL HEALTH LIMITED
Address of Applicant: Berkhamsted Hill, Berkhamsted,
Hertfordshire, ENGLAND
Actual Inventor: Ivor Philip Baker
Address for Service: GRIFFITH HASSEL & FRAZER
71 YORK STREET
SYDNEY NSW 2000
AUSTRALIA

Complete Specification for the invention entitled:

LIQUID FORMULATIONS

The following statement is a full description of this invention, including the best
method of performing it known to me/us:
LIQUID FORMULATIONS

The present invention relates to liquid formulations for localised topical application which contain substances having ectoparasiticidal activity and to methods of controlling parasites of animals by administration of such formulations.

Formulations for localised topical applicaiton, such as pour-on or spot-on formulations, are now well known in the art and are described, for example, in Australian Patent Application 73640/81 and UK Patent Application 8134831 (Publication No. 2088212). These formulations are applied topically to a limited area of the animal's body surface and the ectoparasiticide is believed to migrate over the body surface to control ectoparasites distant from the points of application.

Unfortunately, it has been discovered that a number of solvent systems described in the art provide formulations for localised topical application which cause irritancy or toxicity to the animal on administration. This is particularly the case with substances which are insoluble in a range of solvents, thereby restricting the choice of solvent that can be used to provide a pour-on formulation where the active substance is in solution.

It has now been found that a particular solvent system has the combined properties of low irritancy and appropriate solvency and is particularly suitable for use in formulations for localised topical application.

Accordingly, the present invention provides a pour-on formulation comprising one or more ectoparasiticides in a solvent system comprising 80 to 98% w/v of a fixed oil and 2 to 20% w/v of a volatile silicone.

When used herein, the term "fixed oil" refers to non-volatile oils which are lipids extracted from plants and animals. They are composed mainly of esters of glycerol and higher fatty acids. Examples of fixed oils include arachis, castor, maize, olive, rape and soya oils.

Suitably the fixed oil is dewaxed. Preferably the fixed oil is maize oil.

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Maize oil is a mixture of triglycerides of fatty acids (see for example The Merck Index, 9th Ed., 2510).

Volatile silicones are cyclic dialkylpolysiloxanes (see for example The Merck Index, 9th Ed., 8237).

Preferred volatile silicones include dimethylpolysiloxanes such as V5-7158 marketed by the Union Carbide Corporation, Danbury, Connecticut, USA.

Suitably the solvent system comprises 88 to 98% w/v maize oil and 2 to 12% w/v volatile silicone.

The present formulations may contain up to 18% w/v of additives conveniently used in pour-on formulations, for example spreading agents, synergists, attractants, repellents, adhesion promoters, surface active agents, stabilisers and colouring agents. Suitably the formulations of the present invention contain up to 10% w/v of such additives and preferably below 5% w/v of such additives.

In one preferred embodiment the formulations of the present invention will include less than 1% w/v of additives. Preferably the formulations will contain no additives, or colouring agents are the only additives included and these will be present at a level of 0.5% or less.

Suitable spreading agents are liquids which distribute themselves particularly readily on the skin. Dowanol DPM (dipropylene glycol monomethyl ether) is a particularly suitable spreading agent for inclusion within the formulations of the present invention. Isopropyl myristate is another commonly used spreading agent. Australian Patent Application 73640/81 describes the properties of spreading agents (referred to as spreading oils) and lists various classes of these substances.

Attractants include pheromones such as 2,6-dichlorophenol. Repellents include citronellol, diethyl toluamide, dimethyl phthalate, and the like.

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Adhesion promoters include carboxymethylcellulose, methylcellulose and other cellulose derivatives and starch derivatives, polyacrylates, alginates, gelatin, gum arabic, polyvinylpyrrolidone, polyvinyl alcohol, copolymers of methyl vinyl ether and maleic anhydride, polyethylene glycols, paraffins, oils, waxes and hydrogenated castor oil, colloidal silicic acid or mixtures of the substances mentioned.

The formulations of the present invention do not normally contain surface active agents; however these may be included if desired.

Surface-active agents (comprising emulsifiers and wetting agents) include:

1. anionic surface-active agents, such as Na lauryl sulphate, fatty alcohol ether-sulphates and monoethanolamine salts of mono-/di-alkyldiglycerol ether orthophosphoric acid esters,

2. cationic surface-active agents, such as cetyltrimethylammonium chloride,

3. ampholytic surface-active agents, such as di-Na-N-lauryl-amino-dipropionate or lecithin, and

4. non-ionic surface-active agents, for example, polyoxyethylated castor oil, polyoxyethylated sorbitane monooleate, sorbitan monostearate, ethyl alcohol, glycerol monoesterate, polyoxyethylene stearate and alkylphenol polyglycol ethers.

Stabilisers for preventing the chemical degradation which occurs in the case of some active compounds include, for example, antioxidants, such as tocopherols, butylhydroxyanisole, butylhydroxytoluene and carbodiimides, e.g. Stabaxol (2,2,6,6-tetraisopropyldiphenyl-carbodiimide) and scavengers such as epichlorhydrin. Colouring agents include conventional dyes which are soluble in the carrier of the present invention, such as Sudan Red or Oil Golden Yellow.

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The ectoparasiticide incorporated within a formulation of the present invention may be active against one or more ectoparasite species including insects and acarines, including lice, ticks, keds, mites, fleas and flies.

Water insoluble ectoparasiticides agents are particularly suitable for inclusion in the present invention and include pyrethrins, pyrethroids, carbamates, water-insoluble organo-phosphorus compounds, benzoyl ureas, formamidines, triazines, avermectins (or milbemycins) other standard ectoparasitides and mixtures thereof. Suitable milbemycins are disclosed in Australian published patent applications numbers 42309/78 and 42389/78. Where there are isomers of ectoparasiticides, both the ectoparasitically active isomers themselves and mixtures thereof with non-ectoparasitically active isomers are suitable for inclusion within the formulations of the present invention.

Preferred pyrethroids have the formula

\[ \text{R}_1 \text{CH} - \text{OM} \]

wherein \( M \) is

\[ \text{COCHCHCHC} \]

\[ \text{X}_1 \text{X}_2 \]

\[ \text{CH}_3 \text{CH}_3 \]

\[ \text{COCHCHCHC} \]

\[ \text{X}_1 \text{X}_2 \]

\[ \text{CH}_3 \text{CH}_3 \]

AJR/OLM/21st May 1987
and wherein $X_1$ to $X_4$ are independently selected from halogen-substituted $C_1$-$C_4$ alkyl, and halogen-substituted phenyl;

$X_5$ is -H or halo;

$R_1$ is -H or cyano; and

$R_2$ is phenyl substituted by halogen or halogen-substituted $C_1$-$C_4$ alkoxy, or $R_2^2$ is anilino substituted by halogen and/or halogen-substituted $C_1$-$C_4$ alkyl.

Particularly preferred compounds are presented in Tables I to III.
TABLE I

<table>
<thead>
<tr>
<th>No.</th>
<th>X₁</th>
<th>X₂</th>
<th>X₃</th>
<th>X₄</th>
<th>X₅</th>
<th>R₁</th>
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<tr>
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<tr>
<td>3</td>
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<td></td>
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<td>H</td>
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<td>4</td>
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<tr>
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<tr>
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### TABLE II

\[
M = \begin{array}{c}
\text{CO} \\
\text{CH} \\
\text{CH} \\
\text{CH} \\
\text{CH}_3 \\
\text{CH}_3
\end{array} \begin{array}{c}
\text{C} \\
\text{X}_1 \\
\text{X}_3 \\
\text{X}_4 \\
\text{X}_2
\end{array}
\]

<table>
<thead>
<tr>
<th>No.</th>
<th>(X_1)</th>
<th>(X_2)</th>
<th>(X_3)</th>
<th>(X_4)</th>
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<th>(R_1)</th>
<th>trivial name</th>
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<tr>
<td>9</td>
<td>Br</td>
<td>Br</td>
<td>Br</td>
<td>Br</td>
<td>H</td>
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<tr>
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<td>Cl</td>
<td>Br</td>
<td>Br</td>
<td>H</td>
<td>CN</td>
<td>tralocythrin</td>
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### TABLE III

\[
M = \begin{array}{c}
\text{CO} \\
\text{CH} \\
\text{CH} \\
\text{CH}_3 \\
\text{CH}_3
\end{array} \begin{array}{c}
\text{R}_2
\end{array}
\]

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<tr>
<th>No.</th>
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<tr>
<td>12</td>
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<td>H</td>
<td>CN</td>
<td>flucythrinate</td>
</tr>
<tr>
<td>13</td>
<td>CF_3</td>
<td>H</td>
<td>CN</td>
<td>fluvalinate</td>
</tr>
</tbody>
</table>

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Deltamethrin, cypermethrin, permethrin, flumethrin, cyhalothrin and alphamethrin are particularly suitable pyrethroids for inclusion within the formulations of the invention. Alphamethrin is a 1:1 mixture of the IR - cis S and IS - cis R isomers of \( \alpha \)-cyano-3-phenoxybenzyl-2,2-dimethyl-3-(2,2-dichlorovinyl)-cyclopropanecarboxylate. Cyhalothrin or an individual isomer or mixture of isomers thereof is a particularly preferred pyrethroid.

Preferred carbamates include carbaryl and promacyl

Preferred water-insoluble organophosphorus compounds include the following:

- 0-2-diethylamino-6-methylpyrimidin-4-yl 0,0-diethyl phosphorothioate (pirimiphos-ethyl)
- 0-2-\( \alpha \)-ethylamino-6-methylprimidin-4-yl 0,0-dimethyl phosphorothioate (pirimiphos-methyl)
- 0-(4-bromo-2,5-dichlorophenyl)0,0-diethyl phosphorothioate (bromophos-ethyl)
- 2-chloro-1-(2,4-dichlorophenyl) vinyl diethyl phosphate (chlorfenvinphos)
- 0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl)phosphorothioate (chlorpyrifos)
- 0,0-diethyl-0-(3-chloro-4-methyl-7-coumarinyl)phosphorothioate (coumaphos); 0,0-diethyl-0-(2-isopropyl-6-methyl-pyrimidin-4-yl)phosphorothioate (diazinon);
- 0,0-diethylphosphorothioate (dichlofenthion)
- 2,3-p-dioxanedithiol S,S-bis, 0,0-diethyl phosphorodithioate (dioxathion);
- 0-ethyl-0-(quino1-8-yl)phenolphosphorothioate (oxinothiofos); 0,0,0,0,-tetraethyl S, S'-methylene di(phosphorodithioate)(ethion)
- 0,0-dimethyl-0,2,4,5-trichlorophenyl phosphorothioate (fenchlorphos);
- 0,0-dimethyl-0-(4-dimethylsulfamoylphenyl)phosphorothioate (famphur);
- 0,0-dimethyl-0-(4-nitro-m-tolyl)phosphorothioate (fenitrothion);
- 0,0-diethyl -cyano benzylideneamino-oxy phosphonothioate (phoxim); and (E)-0-2-isopropoxycarbonyl-1-methylvinyl 0-methyl ethylphosphoramidothioate (propetamphos)

AJR/OIM/21st May 1987
Preferred formamidines include water-insoluble compounds of the formula

\[
\begin{align*}
\text{X} & \quad N = \text{CH} \quad R \quad \text{N} = \text{CH} \quad \text{N} \\
\text{X} & \quad \text{X}
\end{align*}
\]

(II)

wherein \(R\) is hydrogen or \(C_{1-6}\) alkyl, and each \(X\) is independently selected from hydrogen, \(C_{1-6}\) alkyl and halo.

Particularly preferred formamidines include \(N,N\)-di-(2,4-xylyliminomethyl)-methylamine (called amitraz).

Preferred triazines include cyromazine.

When a pyrethroid is included in a formulation of the present invention it will suitably be present at a concentration of 10% w/v or less. Cyhalothrin will suitably be present at a concentration from 0.1 to 5%, preferably 1 to 3% and conveniently 2%.

Other active substances, as hereinbefore defined, will suitably be present at a concentration of less than 50%, suitably less than 30%, for example between 1 and 15%. Normally, there will be a maximum of three active substances in the formulation and preferably only one. Preferred mixtures of active substances include a pyrethroid with a second pyrethroid, with a water insoluble organophosphorus compound, for example pirimiphos methyl, with a formamidine, for example amitraz, or with a carbamate, for example promacyl.

Alternatively the ectoparasiticide may be combined in a formulation of the present invention with an anthelmintic, for example a thiazole such as levamisole. The combination of permethrin and levamisole in a solvent system comprising 80-98% w/v of maize oil and 2 to 20% w/v of a volatile silicone is an example of such a formulation.
The invention in a second aspect provides a method of controlling external parasites which comprises making a localised external application of a formulation as hereinbefore defined to an animal. External parasites include those of the Classes Arachnida (especially acarines) and Insecta (especially Phthiraptera and Diptera). External parasites of particular commercial significance include:

**Sheep:**
- *Melophagus ovinus* - ked
- *Damalinia ovis* - biting louse
- *Linognathus ovillus* - sucking louse
- *L. pedalis* - sucking louse
- *Lucilia* spp. - blowfly
- *Culicoides* spp. - midges
- *Hydrotaea irritans* - headfly
- *Oestrus ovis* - nasal botfly
- *Psoroptes ovis* - sheep scab
- *Psorergates ovis* - sheep itchmite
- *Ixodes ricinus*
- *Rhipicephalus* spp.
- *Amblyomma* spp.
- *Haemaphysalis* spp.

**Goats:**
- *Damalinia caprae* - biting louse
- *D. limbata* - biting louse
- *D. crassipes* - biting louse
- *Linognathus stenopsis* - sucking louse

**Cattle:**

a) **Lice**
- *Damalinia bovis* - biting louse
- *Linognathus vituli* - sucking louse
- *Haematopinus eurysternus* - sucking louse
- *Solenopotes capillatus* - sucking louse

b) **Flies**
- *Musca domestica*
- *M. autumnalis*
- *Stomoxys calcitrans*
- *Lyperosia irritans*
- *Haematobia thurouxi potans*
- *H. exigua*
- *Simulium* spp.
- *Glossina* spp.
- *Dermatobia Laminus*
- *Hydrotaea irritans*
- Tabanids
- *Hypoderma* spp.

c) **Ticks**
- *Boophilus microplus*
- *R. decoloratus*
- *Rhipicephalus appendiculatus*
- *R. evertsi*
- *Amblyomma hebraeum*
- *A. variegatum*
- *Hyalomma rufipes*
- *H. truncatum*
- *Haemaphysalis longicornis*
- *Dermacentor* spp.
- *Ixodes* spp.
- *Otoobius megnini*
- *Ornithodorus savignyi*.

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Horses:

a) Flies Musca spp, Stomoxys calcitrans, Tabanids

b) Lice Damalania equi, Haematopinus asini

c) Mange Sarcoptes scabiei var equi

Pigs: Sarcoptes scabiei var suis - mange, Haematopinus suis - sucking louse

Dog: Linognathus setosus - sucking louse, Trichodectes canis - biting louse, Ctenocephalides canis - flea, Rhipicephalus sanguineus - tick, Haemaphysalis leachii - tick, Demodex canis, Otodectes cynotis, Sarcoptes scabiei var canis - manges.

Cat: Notoedres cat face mange, Otodectes cynotis - ear mange
Ctenocephalides felis - cat flea, Ixodes spp - tick, Felicola subrostrata - louse.

Fur bearing animals: Otodectes cynotis - mites of mustelids:

Poultry:

a) Ticks Argas persicus

b) Mites Ornithonyssus sylviarum, Dermanyssus gallinae

Lice Menopon gallinae, Menacanthus stramineus.

The animal is preferably a mammal, and may be selected from cattle, goats, pigs, horses, deer, sheep, fur bearing animals such as mink, rabbits and domestic pets such as cats and dogs. The animal may also be a bird, e.g. selected from ducks, chickens and geese. Suitably the animal is selected from cattle, sheep, pigs and dogs. Preferably the formulations of the present invention will be used to treat lice and keds on sheep and goats and lice, flies and ticks on cattle.

AJR/OLM/21st May 1987
The pour-on formulation may be applied to the animal by any conventional method for the localised application of formulations, for example by wiping an impregnated material over a small area of the animal's body or by the use of commercially available applicators, such as the Clout Backliner Applicator (Registered Trademark) or a pump dispenser or a roll-on or by the apparatus described in Australian Patent No 494198. Generally, the pour-on formulation is applied by pouring in one or several lines or in a spot on the back or shoulder or other parasite predilection sites of the animal. Alternatively, it may be applied by means of a localised spray.

It is a particular advantage of the use of pour-on formulations that only small volumes of the formulation need to be applied. Depending on the size of the animal, the volume applied will generally lie in the range 2-60 ml, and suitably 5-30ml for larger mammals. The amount of active substance, as hereinbefore defined, administered to an animal will depend on the size of the animal, the amount can be between 10 mg and 10 g but will normally be between 10mg and 1g. Preferably 50 to 200mg of active substance will be applied to a sheep and 100 to 600mg of active substance will be applied to a cow.

The formulations of the present invention will be prepared by standard techniques, i.e. in the case where the formulation is a solution by bringing the ectoparasiticide into contact with the solvent system and then gently heating and stirring until dissolved if necessary. If the ectoparasiticide is insoluble in or immiscible with the carrier then a suspension, dispersion or emulsion may be prepared by standard techniques. To prepare a suspension the ectoparasiticide may be ground in the carrier to the required particle size and the remaining excipients added with stirring until the final product is of uniform consistency; generally heating is not necessary. To prepare a dispersion or emulsion, the ectoparasiticide is dissolved in the carrier together with a suitable emulsifier and then admixed with the water or other immiscible vehicle. The whole is homogenised by conventional means. Emulsions, dispersions and suspensions are not preferred formulations of the present invention.

AJR/OLM/21st May 1987
Preferred formulations will now be described by way of example only as follows:

**General Procedure for Preparing Formulations**

**General Preparation:**

In the case of a solid the active ingredient (for example deltamethrin) is added to the solvent with stirring. Gentle heat is applied, where necessary, and stirring is continued until all the solid has dissolved and a homogenous mixture obtained. Auxiliaries to be included in the formulation may be either mixed with the active ingredient before addition of the solvent or added to the homogenous mixture of active ingredient and solvent.

Combinations of active ingredients will be prepared in the same manner as formulations of single active ingredients.

In the case where the active ingredient(s) is a liquid (e.g. supona), then the preparation is prepared by mixing the two (or more) liquids together until the product is homogeneous. Heat will not generally be necessary.

**Example 1**

a) Cyhalothrin technical (88%) 2.25g  
Volatile Silicone VS 7158 4.65g  
Dewaxed Maize Oil (Croda, Hull, England) to 100ml

b) Cyhalothrin technical (88%) 2.25g  
Volatile Silicone VS 7158 9.30g  
Dewaxed Maize Oil (Croda) to 100ml

c) Cyhalothrin technical (88%) 2.25g  
Volatile Silicone VS 7158 4.65g  
Butylhydroxyanisole 0.0465g  
Dewaxed Maize Oil (Croda) to 100ml

AJR/OLM/21st May 1987
Example 2

Cyhalothrin technical (88%) 1.2g
Amitraz technical (99%) 5.0g
Volatile Silicone VS 7158 4.65g
Stabaxol 0.46g
Dewaxed Maize Oil (Croda) to 100ml

Example 3

a) Amitraz technical (99%) 5.0g
Volatile Silicone VS 7158 4.65g
Stabaxol 0.46g
Dewaxed Maize Oil (Croda) to 100ml

b) Deltamethrin Technical (98.5%) 2.02g
Volatile Silicone VS7158 4.65g
Dewaxed Maize Oil (Croda) to 100ml

c) Pirimiphos-ethyl Technical (95.6%) 2.09g
Volatile Silicone VS7158 4.65g
Dewaxed Maize Oil (Croda) to 100ml

d) Pirimiphos-methyl Technical (91.5%) 2.19g
Volatile Silicone VS7158 4.65g
Dewaxed Maize Oil (Croda) to 100ml

e) Diazinon Technical 2.00g
Volatile Silicone VS7158 4.65g
Dewaxed Maize Oil (Croda) to 100ml

f) Supona Technical (90.7%) 2.20g
Volatile Silicone VS7158 4.65g
Dewaxed Maize Oil (Croda) to 100ml

AJR/OLM/21st May 1987
<table>
<thead>
<tr>
<th>Example</th>
<th>Chemical Name</th>
<th>Concentration</th>
<th>Volatile Silicone</th>
<th>De-waxed Oil Type and Supplier</th>
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<td>Cypermethrin Technical</td>
<td>2.00g</td>
<td>4.65g</td>
<td>Dewaxed Maize Oil (Croda) to 100ml</td>
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<tr>
<td>h)</td>
<td>Deltamethrin Technical (98.5%)</td>
<td>1.02g</td>
<td>4.65g</td>
<td>Dewaxed Maize Oil (Croda) to 100ml</td>
</tr>
<tr>
<td>i)</td>
<td>Deltamethrin Technical (98.5%)</td>
<td>0.51g</td>
<td>4.65g</td>
<td>Dewaxed Maize Oil (Croda) to 100ml</td>
</tr>
<tr>
<td>j)</td>
<td>Flumethrin Technical (95%)</td>
<td>1.05g</td>
<td>4.65g</td>
<td>Dewaxed Maize Oil (Croda) to 100ml</td>
</tr>
</tbody>
</table>

**Example 4**

<table>
<thead>
<tr>
<th></th>
<th>Chemical Name</th>
<th>Concentration</th>
<th>Volatile Silicone</th>
<th>Oil Type and Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Cyhalothrin Technical (88%)</td>
<td>2.25g</td>
<td>4.65g</td>
<td>Dewaxed Sunflower Oil (Cargill UK) to 100ml</td>
</tr>
<tr>
<td>b)</td>
<td>Cyhalothrin Technical (88%)</td>
<td>2.25g</td>
<td>4.65g</td>
<td>Rape Oil (Cargill UK) to 100ml</td>
</tr>
<tr>
<td>c)</td>
<td>Cyhalothrin Technical (88%)</td>
<td>2.25g</td>
<td>4.65g</td>
<td>Dewaxed Soyabean Oil (Cargill UK) to 100ml</td>
</tr>
<tr>
<td>d)</td>
<td>Cyhalothrin Technical</td>
<td>2.25g</td>
<td>4.65g</td>
<td>Groundnut (Arachis) Oil (Chambers and Fargo) to 100ml</td>
</tr>
</tbody>
</table>

AJR/OLM/21st May 1987
e) Cyhalothrin Technical 2.25g  
Volatile Silicone VS7158 4.65g  
Olive Oil (Andrew Steven Ltd.) to 100ml

f) Cyhalothrin Technical 2.25g  
Volatile Silicone VS7158 4.65g  
Castor Oil, No. 1 grade (Croda) to 100ml

g) Cyhalothrin Technical 2.25g  
Volatile Silicone VS7158 4.65g  
Castor Oil, commercial grade (Croda) to 100ml

AJR/OLM/21st May 1987
Claims

The claims defining the invention are as follows:

1. A pour-on formulation comprising one or more ectoparasiticides in a solvent system comprising 80 to 98% w/v of a fixed oil and 2 to 20% w/v of a volatile silicone.

2. A pour-on formulation according to claim 1 wherein the fixed oil is selected from arachis, castor, maize, olive, rape and soya oils.

3. A pour-on formulation according to claim 1 wherein the solvent system comprises 88 to 98% w/v maize oil and 2 to 12% w/v volatile silicone.

4. A pour-on formulation according to any one of claims 1 to 3 wherein the ectoparasiticides are selected from pyrethrins, pyrethroids, carbamates, water-insoluble organo-phosphorous compounds, benzoyl ureas, formamidines, triazines, avermectins and milbemycins.

5. A pour-on formulation according to any one of claims 1 to 4 wherein the ectoparasiticides are selected from deltamethrin, cypermethrin, permethrin, flumethrin, cyhalothrin, alphamethrin, amitraz, pirimiphos methyl and promacyl.

6. A method for the control of external parasites on animals which comprises making a localised external application of a pour-on formulation according to any one of claims 1 to 5 to the animal.

7. A pour-on formulation according to any one of claims 1 to 5 for use in the control of external parasites on animals.

8. A method for the preparation of a pour-on formulation according to any one of claims 1 to 5 which comprises bringing the ectoparasiticide into contact with the solvent system and thereafter mixing and/or gently heating if required.

AJR/OLM/21st May 1987
9. A pour-on formulation substantially as disclosed in any Example.

Dated this 5th day of June 1987

COOPERS ANIMAL HEALTH LIMITED
By their Patent Attorney
GRIFFITH HASSEL & FRAZER