1,006,772

PATENT SPECIFICATION

NO DRAWINGS

1,006,772

Date of Application and filing Complete Specification: Aug. 19, 1964.

No. 33843/64.

Application made in United States of America (No. 311,328) on Sept. 25, 1963.

Complete Specification Published: Oct. 6, 1965.

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Index at acceptance:—A5 B2S

Int. Cl.:—A 61 k 3/00

COMPLETE SPECIFICATION

Methods and Compositions for use in Animal Husbandry

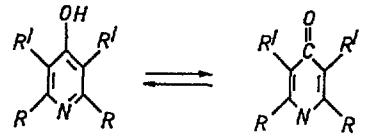
We, THE DOW CHEMICAL COMPANY, a Corporation organised and existing under the Laws of the State of Delaware, United States of America, of Midland, County of Midland, State of Michigan, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to animal husbandry and more particularly to methods and compositions employed for improving the growth of animals, for improving the efficiency of the utilization of animal feed, for controlling protozoan organisms and for mitigating against the attack of gastro-intestinal parasites.

The present invention provides a new and improved practice for raising and benefiting animals and fowl such as pigs, dogs, lambs, calves, chickens, ducks, pigeons, geese, turkeys and other domesticated animals. This invention further provides a new and improved method for mitigating against and protecting animals from the attack of gastro-intestinal parasites and protozoan organisms, particularly coccidia. In addition, the invention provides a method of improving the nutritive value of the feed ingested and utilized by animals so as to obtain a growth-furthering effect and an improved feed utilization.

This invention also provides novel compositions employed in the new methods in animal husbandry.

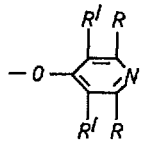
The new method comprises administering to animals a 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol and/or its lower alkanoic acid ester and/or its alkali metal, ammonium or mineral acid salt. The 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol corresponds to the formula:



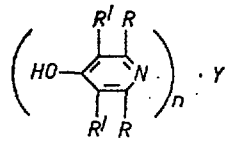
Enol form Keto form

In this and succeeding formulae, each R represents lower alkyl and each R^1 represents halogen. The alkali metal and ammonium salts correspond to the formula:

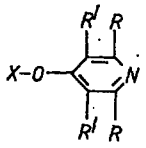
alkali metal or ammonium radical



The mineral acid salts are represented by the following formula



wherein Y is the mineral acid and n is an integer not greater than the number of acid hydrogen atoms in the mineral acid. Preferred salts are those wherein n corresponds to the number of acid hydrogen atoms in said acid. The lower alkanoic acid esters are represented by the following formula



wherein X represents lower alkanoyl. In the present specification the expressions "lower alkyl," "lower alkanoyl", and "lower alkanoic acid" refer to radicals or acids containing not in excess of four carbon atoms. Thus, the expression "lower alkyl" refers to radicals such as methyl, ethyl, propyl, isopropyl, butyl, secondary butyl and tertiary butyl and the expression "lower alkanoyl" to the alkanoyl radicals derivable from such acids as formic, acetic, propionic, butyric, and isobutyric.

By the practice of the present invention the nutritive value of animal feed can be improved so as to obtain a growth-furthering effect and the efficiency of the utilization of feed by animals can also be improved. The practice also makes possible improvement of the growth made by the animals and protection of the animals from parasitic diseases of the gastro-intestinal tract and particularly from coccidiosis. Further, by the practice of the invention animals can be protected from mixed coccidial infections and from the various strains of the same species of coccidial organism and particularly from the various strains of *Eimeria tenella* and *necatrix*. Also, the practice allows animals which are exposed to the coccidial infection to develop acquired immunity to the disease.

The pyridine-type compounds are crystalline solids which are soluble in organic solvents and administered to animals. The alkali metal, ammonium and mineral acid salts such as the sodium, potassium, lithium, hydrochloride, hydrobromide, hydroiodide, nitrate, nitrite, sulfate, acid sulfate, sulfite, phosphite, acid phosphate and phosphate are soluble in water. The compounds can be employed in admixture with grain rations or animal feeds. They can be administered continuously or intermittently in dosages sufficient to improve growth, to improve the feed efficiency, to improve the nutritive value and utilization of feed, or to protect the animal from the attack of gastro-intestinal parasites without adversely affecting the metabolic activity, reproduction or the blood-forming organs, or without imparting any unpalatable characteristic to animal flesh.

In the oral administration or feeding of the compounds, good results can be obtained when the animals are fed a daily dosage of from 3 to 2,000 milligrams of the compounds per kilogram of body weight and preferably from 3 to 250 milligrams per kilogram of body weight. Where danger of re-exposure to the attack of intestinal parasites from contaminated feed or surroundings is low, good results can be obtained when the animals are fed a daily dosage of 35 miligrams or more per kilogram of body weight for a period of from 2 to 5 days.

The method of the present invention can be carried out by the oral administration or feeding of the unmodified compounds. However, the present invention also embraces the employment of a liquid, powder, mash, pellet, capsule or animal food containing said compounds. In such usage, the compounds can be admixed with one or more of a plurality of additives or innocuous ingestible adjuvants including water, ethanol, skim milk, edible oils, propylene glycol, syrups, grain rations, surface active dispersing agents such as the liquid and solid emulsifying agents and edible solid carriers such as edible powders and commercial animal feeds, concentrates or supplements. The expression "commercial animal feeds, concentrates or supplements" as used herein includes the partial and complete animal feeds containing desirable amounts of minerals, vitamins, antioxidants, antibiotics and growth stimulants. In such animal feed compositions, the adjuvant can cooperate with the active agent so as to facilitate the invention and obtain an improved result. Further, the compositions can be fed to animals to supply the desired dosage of active agent, or be employed as concentrates and subsequently diluted with additional carrier or adjuvant to provide the ultimate compositions.

Advantageously the active agent is present in an amount of at least 0.001 per cent by weight based on the weight of the total composition. However, the exact concentration of the compounds to be employed in the compositions can vary depending on the method of administration. For example, where direct administration to the individual animal is preferred, liquid or solid compositions containing from 5 to 98 per cent by weight of the active agents can be employed to supply the desired dosage. Where the compounds are provided as a constituent of the principal food ration, satisfactory results can be obtained with food rations containing a minor but effective amount of the compounds. The exact amounts of the compounds in the ration are dependent upon the food consumption and feeding habits of the animal concerned. In poultry and fowl, the required dosages can be suppled with mash compositions containing from 0.001 to 0.1 per cent by weight of the active agents. In larger animals such as pigs, the required dosage can be supplied with mash compositions containing from 0.001 to 0.5 per cent by weight of active material when fed as the principal food ration. Where the compounds are furnished in the drinking water, good results can be obtained at concentrations of the agents in the water equal to one-half those employed when the compounds are supplied as a constituent in the

principal food ration. In compositions to be employed as concentrates, the active agents can be present in a concentration of from 5 to 98 per cent by weight. Preferred concentrate compositions oftentimes contain two or more per cent by weight of a liquid or solid surface active agent.

Liquid compositions containing the desired amount of the compounds can be prepared by dissolving the compounds in ethanol, propylene glycol or an edible oil or by dispersing them in water with or without the aid of a suitable surface active dispersing agent such as an ionic or non-ionic surface active agent. Suitable surface active dispersing agents include the glycerol and sorbitan esters of fatty acids and the polyoxyalkylene derivatives of fatty alcohols and of sorbitan esters. The aqueous compositions can contain one or more water-immiscible oils as a solvent for the active agent. In such compositions, the water, oil and emulsifying agent constitute an aqueous emulsion adjuvant or helper.

In the preparation of solid feed compositions, the compounds can be mechanically ground with an edible solid such as cereal meal, oyster shell flour, or a solid surface active dispersing agent such as finely divided bentonite or fuller's earth. These compositions can be administered in the form of capsules or tablets or dispersed in an animal feed and such feed used to supply a part or all of the ration. Alternatively, the compounds can be dissolved in an organic solvent such as alcohol or acetone and the resulting mixture dispersed in an animal feed which is then dried to remove the solvent. The compounds can also be dispersed in an edible oil such as coconut, olive, cottonseed or peanut oil and the resulting mixtures dispersed in the feed. These edible oil compositions can contain one of the aforementioned emulsifying materials as a dispersing agent.

The following examples illustrate the invention.

EXAMPLE 1

3,5 - Dichloro - 2,6 - dimethylpyridinol was dispersed in commercial poultry mash to produce animal feed compositions containing various amounts of the pyridinol compound. Portions of these compositions and unmodified mash were fed as a sole feed ration to flocks of chickens of the same history and past environment which were about 17 days old. One day after the diets were begun, 50,000 sporulated *Eimeria necatrix* oocysts were introduced directly into the corp of the birds. Another flock of birds was left untreated and uninoculated to serve as an uninfected check. Seven days following the initiation of the diets, the birds were sacrificed, autopsied and an examination made to determine the per cent control of coccidiosis and the coccidial organisms. The per cent control of coccidiosis and the coccidial organisms obtained in the evaluations at the indicated per cent by weight of pyridinol compound in the diets as well as in the infected and uninfected checks is set forth in the following table.

Agent Employed in Diet	Per Cent by Weight of Agent in Feed	Per cent Control of Coccidiosis and the Coccidial Organisms
3,5-Dichloro-2,6-dimethyl-pyridinol	0.05 0.025 0.0125 0.0063	100 100 100 96
Infected check	0	all birds heavily infected with coccidial organisms
Uninfected check	0	no coccidial organisms or disease

EXAMPLE 2

3,5 - Dichloro - 2,6 - dimethylpyridinol and 3,5 - dibromo - 2,6 - dimethylpyridinol were dispersed in commercial poultry mash to produce animal feed compositions containing 0.01 per cent by weight of one of the pyridinol compounds. Portions of these compositions and unmodified mash were fed as sole feed rations to flocks consisting of about 32 chickens of the same history and past environment which were about one week old. Just prior to the initiation of the diets, and 7 weeks thereafter, the birds were weighed and the average weight gain per bird for each test group determined. During the 7 weeks, a record was kept of the feed consumed by each test group and the feed efficiency factor or number of grams of feed eaten per gram of body weight gained was determined.

Agent Employed in Diet	Average Weight Gain Per Bird in Grams	Feed Efficiency Factor
3,5-Dichloro-2,6-dimethylpyridinol	1295	2.31
3,5-Dibromo-2,6-dimethylpyridinol	1295	2.20
Check	1276	2.38

EXAMPLE 3

Portions of the feed compositions as described in Example 1 and unmodified poultry feed were fed as a sole ration of groups of chickens of the same history and past environment. Each test group consisted of 30 birds which were about 16 days old. The birds were maintained on wire in battery brooders according to conventional sanitary poultry practices. One day following the initiation of the diets, 200,000 sporulated oocysts of a mixed culture of *Eimeria tenella* oocysts and *Eimeria necatrix* oocysts were introduced directly into the crop of each bird. Another 30 bird flock was left untreated and uninoculated to serve as an uninfected check.

During the interval between the 4th and 11th days following the initiation of the diets, the birds were observed for bloody diarrhea and gastro-intestinal hemorrhage attributable to coccidial disease and the attack of the coccidial orgamisms. Hemorrhage scores were made with 0 for no hemorrhage, 1 for slight hemorrhage, 2 for moderate hemorrhage, 3 for severe hemorrhage and 4 for very severe hemorrhage.

Following the inoculation, the birds were observed for mortality, and any birds which died were autopsied to ascertain whether or not their death was attributable to coccidial disease and the attack of the coccidial organisms. The hemorrhage scores for the treated birds were also compared with the hemorrhage scores for the infected checks and the per cent control of hemorrhage determined. The results obtained in these operations are set forth in the following table.

Per Cent Concentration Used in Feed	Per Cent Mortality Due to *Eimeria tenella and Eimeria necatrix*	Per Cent Control of Hemorrhage
3,5-Dichloro-2,6-dimethylpyridinol		
0.025	0	100
0.0125	0	100
0.0063	0	100
Infected check	93	all birds showed very severe hemorrhage
Uninfected check	0	no hemorrhage

EXAMPLE 4

Portions of the feed compositions as described in Example 2 containing 3,5 - dichloro-2,6 - dimethylpyridinol and 3,5 - dibromo - 2,6 - dimethylpyridinol and unmodified feed were employed in the manner as described in the preceding example and were fed to 30 bird groups of chickens subsequently inoculated with *Eimeria necatrix*. In such operations, the inoculum employed per bird contained 200,000 sporulated *necatrix* oocysts. The results obtained in these operations are set forth in the following table.

Per Cent Concentration Used in Feed	Per Cent Mortality Due to *Eimeria necatrix*
3,5-Dichloro-2,6-dimethyl-pyridinol	
0.063	0
0.0125	0
3,5-Dibromo-2,6-dimethyl-pyridinol	
0.063	0
0.0125	0
Infected check	93
Uninfected check	0

EXAMPLE 5

In a similar operation, 3,5 - dichloro - 2,6 - dimethylpyridinol and 3,5 - dibromo - 2,6 - dimethylpyridinol were fed as constituents of animal feed to 30 bird groups of chickens and the chickens subsequently inoculated with a mixed culture of various species of coccidia. In such operations, the inoculum employed per bird contained sporulated coccidial oocysts in number and type as follows: 30,000 *Eimeria tennela*, 30,000 *Eimeria necatrix*, 50,000 *Eimeria brunetti*, 400,000 *Eimeria mivati* and 200,000 *Eimeria acervulina*. The results obtained in these operations are set forth in the following table.

Per Cent Concentration Used in Feed	Per Cent Mortality Due to Coccidia	Per Cent Control of Hemorrhage
3,5-Dichloro-2,6-dimethylpyridinol		
0.0063	0	100
0.0125	0	100
3,5-Dibromo-2,6-dimethylpyridinol		
0.0063	0	100
0.0125	0	100
Infected check	77	all birds showed bery severe hemorrhage
Uninfected check	0	no hemorrhage

EXAMPLE 6

3,5 - Dibromo - 2,6 - dimethylpyridinol; 3,5 - dibromo - 2,6 - dimethylpyridinol, hydrobromide; 3,5 - diiodo - 2,6 - dimethylpyridinol; 3,5 - dibromo - 2,6 - dimethylpyridinol, sodium salt; 3,5 - dibromo - 2,6 - diethylpyridinol; 3,5 - dibromo - 2,6 - dimethylpyridyl acetate; 3,5 - dibromo - 2,6 - dipropylpyridinol; 3,5 - dibromo - 2 - ethyl - 6 - methylpyridinol; and 3,5 - dichloro - 2,6-dimethylpyridinol, potassium salt were dispersed in commercial poultry mash to produce animal feed compositions containing various amounts of one of the pyridinol compounds. Portions of these compositions and unmodified mash were employed as described in Example 1 and were fed to flocks of chickens and the chickens inoculated with 50,000 sporulated *Eimeria necatrix* oocysts per bird. One week following the initiation of the diets, the birds were sacrified, autopsied and an examination made to determine the per cent control of coccidiosis. The results obtained in these operations are set forth in the following table.

Agent Employed in Diet	Per Cent by Weight of Agent in Feed	Per Cent Control of Coccidiosis and the Coccidial Organisms
3,5-Dibromo-2,6-dimethylpyridinol	0.025 0.0125 0.0062	100 100 100
3,5-Dibromo-2,6-dimethylpyridinol, hydrobromide	0.025 0.0125 0.0062	100 100 89
3,5-Diiodo-2,6-dimethylpyridinol	0.05 0.025	100 92
3,6-Dibromo-2,6-dimethylpyridinol, sodium salt	0.05 0.025 0.0125 0.0062	100 100 100 90
3,5-Dibromo-2,6-diethylpyridinol	0.05	85
3,5-Dibromo-2,6-dimethylpyridyl acetate	0.025 0.0125 0.0062	100 100 89
3,5-Dibromo-2,6-dipropylpyridinol	0.05	100
3,5-Dibromo-2-ethyl-6-methylpyridinol	0.05 0.025	100 96
3,5-Dichloro-2,6-dimethylpyridinol, potassium salt	0.05 0.025 0.0125 0.0062	96 96 100 89
Infected check	0	all birds heavily infected with coccidial organisms
Uninfected check	0	no coccidial organisms or disease

The 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinols employed in accordance with the present teachings can be conveniently prepared by halogenation of the 2,6 - di(lower alkyl) - 4 - pyridinols at temperatures of from 15° to 100°C. in a halo-acid in dilute aqueous form as reaction medium. Following the halogenation, the reaction mixture is neutralized, conveniently with aqueous ammonia, and thereafter filtered to obtain the desired 3,5 - dihalo-2,6 - di(lower alkyl) - 4 - pyridinol as a crystalline material.

Where it is desired to introduce different halogen atoms into the molecule, the 2,6 - di(lower alkyl) - 4 - pyridinol can be nitrated by known procedures with nitric acid to prepare a 3 - nitro - 2,6 - di(lower alkyl) - 4 - pyridinol. Hydrogenation of the 3 - nitro - 2,6 - di(lower alkyl) - 4 - pyridinol with hydrogen at room temperature in ethanol as reaction medium and in the presence of a palladium catalyst yields the corresponding 3-amino - 2,6 - di(lower alkyl) - 4 - pyridinol. The latter amino compound is thereafter diazotized with sodium nitrite (NaOHO) in an aqueous hydrogen halide acid to produce a monohalo - 2,6 - di(lower alkyl)pyridinol. Halogenation of this monohalo - 2,6 - di(lower alkyl)pyridinol in the manner as described in the preceding paragraph gives the desired 3,5-

dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol containing the same or different halogen atoms on the ring as may be desired.

Treatment of the 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinols with a stoichiometric amount of a mineral acid, alkali metal or ammonia in water as reaction medium gives the mineral acid, alkali metal or ammonium salts. The lower alkanoic acid esters that can be employed in accordance with the present invention can be prepared by reacting the 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinols with a lower alkanoic acid or lower alkanoic acid anhydride such as acetic anhydride, propionic anhydride or butyric anhydride. The reaction or esterification is preferably carried out at temperatures of from about 100° to 200°C. and in an organic solvent such as dimethylformamide as reaction medium.

The 2,6 - di(lower alkyl) - 4 - pyridinols used as starting materials for preparing the 3,5 - dihalo compounds by the above described procedures can be prepared in known procedures from 2 - alkanoyl - 3 - oxo - 4 - alkanoic acid, Δ - lactones by decarboxylation with hydrochloric acid at about 100°C. followed by ammonolysis with aqueous ammonia.

WHAT WE CLAIM IS:—

1. Method in the practice of animal husbandry which comprises orally administering to animals a 3,5 - dihalo - 2,6 - di(lower alkyl)-4 - pyridinol or a lower alkanoic acid ester, an alkali metal salt, ammonium salt, or a mineral acid salt thereof.

2. Method in accordance with Claim 1, characterized in that the agent is 3,5 - dichloro - 2,6 - dimethyl - 4 - pyridinol.

3. Method in accordance with Claim 1, characterized in that the agent is 3,5 - dichloro - 2,6 - dimethyl - 4 - pyridinol, sodium salt.

4. Method in acordance with Claim 1, characterized in that the agent is 3,5 - dibromo - 2,6 - dimethyl - 4 - pyridinol.

5. Method in accordance with Claim 1, characterized in that the agent is 3,5 - dibromo - 2,6 - dimethyl - 4 - pyridinol, sodium salt.

6. Method in accordance with Claim 1, characterized in that the agent is 3,5 - dichloro - 2,6 - dimethyl - 4 - pyridyl acetate.

7. Method in accordance with any of Claims 1 to 6, characterized in that the agent is employed daily in an amount of from 3 to 2,000 milligrams per kilogram of body weight.

8. Method in accordance with any of Claims 1 to 7, characterized in that the agent is employed in admixture with an innocuous, ingestible carrier.

9. Compositions useful in the method of any of Claims 1 to 8 which comprise an agent in admixture with an edible, finely divided solid, wherein the agent is a 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol or a lower alkanoic acid ester, an alkali metal salt, ammonium salt, or a mineral acid salt thereof.

10. Compositions in accordance with Claim 9, characterized in that the agent is 3,5 - dichloro - 2,6 - dimethyl - 4 - pyridinol.

11. Compositions in accordance with Claim 9, characterized in that the agent is 3,5 - dichloro - 2,6 - dimethyl - 4 - pyridinol, sodium salt.

12. Compositions in accordance with Claim 9, characterized in that the agent is 3,5 - dibromo - 2,6 - dimethyl - 4 - pyridinol.

13. Compositions in accordance with Claim 9, characterized in that the agent is 3,5 - dibromo - 2,6 - dimethyl - 4 - pyridinol, sodium salt.

14. Compositions in accordance with Claim 9, characterized in that the agent is 3,5 - dichloro - 2,6 - dimethyl - 4 - pyridyl acetate.

15. Compositions in accordance with any of Claims 9 to 14, characterized in that the agent is present in an amount of at least 0.001 per cent by weight based on the total weight of the composition.

16. Compositions in accordance with any of Claims 9 to 15, characterized in that the agent is present in an amount of from 5 to 98 per cent by weight based on the total weight of the composition.

17. Method which comprises orally administering to animals a 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol or a lower alkanoic acid ester, an alkali metal salt, ammonium salt, or a mineral acid salt thereof, substantially as hereinbefore described with reference to the Examples.

18. Compositions comprising a 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol or a lower alkanoic acid ester, an alkali metal salt, ammonium salt, or a mineral acid salt thereof in admixture with an edible finely - divided solid, substantially as hereinbefore described.

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Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press (Leamington) Ltd.—1965. Published by The Patent Office, 25 Southampton Buildings, London, W.C.2, from which copies may be obtained.

dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol containing the same or different halogen atoms on the ring as may be desired.

Treatment of the 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinols with a stoichiometric amount of a mineral acid, alkali metal or ammonia in water as reaction medium gives the mineral acid, alkali metal or ammonium salts. The lower alkanoic acid esters that can be employed in accordance with the present invention can be prepared by reacting the 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinols with a lower alkanoic acid or lower alkanoic acid anhydride such as acetic anhydride, propionic anhydride or butyric anhydride. The reaction or esterification is preferably carried out at temperatures of from about 100° to 200°C. and in an organic solvent such as dimethylformamide as reaction medium.

The 2,6 - di(lower alkyl) - 4 - pyridinols used as starting materials for preparing the 3,5 - dihalo compounds by the above described procedures can be prepared in known procedures from 2 - alkanoyl - 3 - oxo - 4 - alkanoic acid, Δ - lactones by decarboxylation with hydrochloric acid at about 100°C. followed by ammonolysis with aqueous ammonia.

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1. Method in the practice of animal husbandry which comprises orally administering to animals a 3,5 - dihalo - 2,6 - di(lower alkyl)- 4 - pyridinol or a lower alkanoic acid ester, an alkali metal salt, ammonium salt, or a mineral acid salt thereof.

2. Method in accordance with Claim 1, characterized in that the agent is 3,5 - dichloro - 2,6 - dimethyl - 4 - pyridinol.

3. Method in accordance with Claim 1, characterized in that the agent is 3,5 - dichloro - 2,6 - dimethyl - 4 - pyridinol, sodium salt.

4. Method in acordance with Claim 1, characterized in that the agent is 3,5 - dibromo - 2,6 - dimethyl - 4 - pyridinol.

5. Method in accordance with Claim 1, characterized in that the agent is 3,5 - dibromo - 2,6 - dimethyl - 4 - pyridinol, sodium salt.

6. Method in accordance with Claim 1, characterized in that the agent is 3,5 - dichloro - 2,6 - dimethyl - 4 - pyridyl acetate.

7. Method in accordance with any of Claims 1 to 6, characterized in that the agent is employed daily in an amount of from 3 to 2,000 milligrams per kilogram of body weight.

8. Method in accordance with any of Claims 1 to 7, characterized in that the agent is employed in admixture with an innocuous, ingestible carrier.

9. Compositions useful in the method of any of Claims 1 to 8 which comprise an agent in admixture with an edible, finely divided solid, wherein the agent is a 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol or a lower alkanoic acid ester, an alkali metal salt, ammonium salt, or a mineral acid salt thereof.

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17. Method which comprises orally administering to animals a 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol or a lower alkanoic acid ester, an alkali metal salt, ammonium salt, or a mineral acid salt thereof, substantially as hereinbefore described with reference to the Examples.

18. Compositions comprising a 3,5 - dihalo - 2,6 - di(lower alkyl) - 4 - pyridinol or a lower alkanoic acid ester, an alkali metal salt, ammonium salt, or a mineral acid salt thereof in admixture with an edible finely - divided solid, substantially as hereinbefore described.

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1 MAY 1965

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