

# PATENT SPECIFICATION

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## (54) MOLASSES FEED BLOCK FOR ANIMALS AND METHOD OF MAKING SAME

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 251 Altura Drive, Fullerton, Orange County,  
 State of California, United States of America,  
 citizen of the United States of America, do  
 hereby declare the invention, for which I pray  
 that a patent may be granted to me, and the  
 method by which it is to be performed, to  
 be particularly described in and by the fol-  
 lowing statement:—

Prior high energy supplements for feeding  
 animals in agriculture have normally been in  
 the form of liquids. Animals lick blocks for  
 pasture use sometimes used for this purpose  
 are most usually prepared by pressure and  
 contain only about 10—30 percent by weight  
 of molasses. When higher molasses content is  
 necessary it is difficult to form acceptable lick  
 blocks. In some cases the molasses is impreg-  
 nated on another feedstuff such as soybean  
 millfeed and compressed with a wet binder.

According to one aspect of the present  
 invention we provide a rigid, vitreous animal  
 lick block which comprises at least 50% of  
 hard solidified molasses as the primary struc-  
 tural and nutritional basis for the block and  
 also comprises a medicament and/or a growth  
 enhancing additive and/or another animal feed  
 or supplement material. These blocks may con-  
 tain a high proportion of fat diet as supple-  
 ment, for example up to 30 percent by weight  
 and/or they may contain up to 10% by weight  
 of salt. The blocks may contain up to 1%  
 by weight of phosphorous in phosphate form  
 and up to 5% by weight of plant feed  
 material.

As stated above, molasses forms both the  
 primary structural basis or matrix material for  
 feed supplement lick blocks according to the  
 invention and the primary nutritional basis  
 for the blocks. This can then form the basis  
 for a wide variety of feed supplement com-  
 positions according to the invention, and as  
 will be seen from the examples set forth in  
 detail hereinafter, the applicant has success-  
 fully produced by the method of the invention  
 lick blocks which are entirely molasses, are

a combination of molasses and salt, a com-  
 bination of molasses and fat, a combination of  
 molasses and urea, a combination of molasses,  
 fat, and urea, and each of the foregoing com-  
 binations to which various essential vitamins,  
 medicaments and minerals have been added.

Regardless of whether the lick block to be  
 produced according to the invention is entirely  
 molasses, or is some combination of molasses  
 and one or more other ingredients, harden-  
 ing of the molasses content, and hence of  
 the blocks themselves, can be reliably and  
 uniformly accomplished by the same series  
 of method steps described below. Throughout  
 the whole range of molasses content accord-  
 ing to this invention, it has been found that  
 the desired rigid, vitreous physical character-  
 istics of the blocks can be reliably achieved.

Throughout the present specification and  
 claims all parts and percentages are by weight  
 unless otherwise stated.

According to a second aspect of the inven-  
 tion, a method for making a rigid vitreous  
 animal lick block comprises the steps of heat-  
 ing a material comprising from 50% to 100%  
 of molasses at a temperature ranging from  
 221°F. (105°C) to 321°F. (161°C.), the pre-  
 ferred temperature being about 270°F.  
 (132°C.), for a period of time ranging from  
 three to twelve minutes, and preferably  
 between five and seven minutes, drawing a  
 vacuum of at least 24" Hg. on said material,  
 breaking said vacuum, introducing the  
 material into moulding means to form said  
 material into a block while it is still suffi-  
 ciently hot to be formable, and allowing the  
 material to cool until it hardens into a formed  
 block. The vacuum is preferably maintained  
 for 1 minute or more, most preferably for  
 2 to 3 minutes. The vacuum is suitably at  
 least 29 inches Hg. The material may be  
 stirred during the steps of heating and of  
 drawing the vacuum.

Drawing of the vacuum on the material at  
 the end of the heating cycle accelerates  
 evaporation of moisture, which appears to be

[Price 25p]

a factor in the hardening process. However, it also appears that breaking of the vacuum causes microcrystallization of some of the sugars in the molasses, which appears to be the principal factor assuring uniform hardness of the final product. The application of the vacuum and the breaking thereof have been found in experimental practice to be important for the reliable and uniform production of hard, vitreous blocks.

Molasses lick blocks thus produced are soluble in water, and the surfaces thereof will soften when dampened. Accordingly, the lick blocks are readily but relatively slowly consumed by licking and chewing thereof. An important factor in rendering the blocks desirable for consumption is that the hardened molasses has a hygroscopic quality, causing surface portions of the blocks to open up and become desirably moist.

The molasses which is employed for producing lick blocks according to the invention is preferably cane molasses having a specific gravity between 70° and 82° Brix, which is readily available in tankers or in drums. Citrus molasses or beet molasses may alternatively be employed as the basis for the feed blocks of the present invention.

The following are examples of some of the products which the applicant has produced according to the invention. It is to be understood that these products are given by way of example only, and not by way of limitation.

#### EXAMPLE 1

##### Molasses Block (no additives)

105 pounds of molasses of 70° to 82° Brix specific gravity was placed in a large, closable kettle, the temperature being elevated to within the range of from 221°F. (105°C.) and 321°F. (161°C.), preferably 270°F. (132°C.), and this temperature applied for from 3 to 12 minutes with stirring, preferably within the range of 5 to 7 minutes, at which time a vacuum was drawn on the boiling product. A vacuum of 29 inches of mercury has generally been employed by the applicant, but substantial variations in the amount of vacuum can be employed within the scope of the invention. The greater the vacuum applied, the more rapidly and reliably the product appears to harden, and it is accordingly preferred to have a relatively high vacuum condition such as about 29 inches of mercury.

The amount of evaporation of moisture is controllable by the extent of time that the vacuum is held, and although breaking of the vacuum after about one minute produces satisfactory and reliable hardening, it is preferred to hold the vacuum for two minutes or more, preferably for two to three minutes. When the vacuum is broken, the hot molasses is immediately poured into molds of any configuration, in which the molasses will

set up and harden into blocks within a short period of time. From the 105 pounds of liquid molasses, a yield of approximately 100 pounds of material in the form of one or more hard blocks results. The resulting material is seemingly glassy or vitreous in nature, and it is so hard that it will shatter when struck with a mallet or dropped from a substantial height.

For cattle feeding, the blocks are preferably formed into units between 20 and 100 pounds each in weight.

Since a block according to this example is 100 percent molasses, with no additives, it may conveniently be transported and stored without requiring the use of tankers or drums. Since these blocks have no excess moisture such as is required for liquification thereof, they are of minimum weight for shipping. Additionally, by making the blocks in the shape of a cube or other regular solid shape, shipping and storing space can be minimized.

#### EXAMPLE 2

##### Molasses-Salt Block

Molasses is placed in a closed kettle and salt, which can be sodium chloride or a mixture of sodium chloride and other salts, to produce a starting salt percentage of from 1 to 10 percent salt, is added to the molasses. As in Example 1, this combination is heated preferably to about 270°F. (132°C.) for 5 to 7 minutes, with stirring, at which time the vacuum is drawn upon the container for preferably from 2 to 3 minutes. At this time the vacuum is broken and the heated, liquid mixture poured into molds. The blocks are hard and of crystalline consistency within a short period of time. These blocks have been tested in cattle feeding, and a molasses-salt lick block containing approximately 5 percent salt appears to be most acceptable and accordingly is preferred.

#### EXAMPLE 3

##### Molasses-fat Block

It is known that with some domestic animals, particularly range fed cattle, there may be a deficiency of fat in the diet. Accordingly, any of a variety of fats can be embodied in the molasses lick block to make up for this deficiency. Suitable fats are tallow, acidulated soap stock, cottonseed, corn or soy oil residue, or mixtures of these.

The molasses-fat block preferably has a fat content up to 30 percent of the total block, with a preferred range of from 5 to 20 percent fat. Small amounts of suitable antioxidants may also be included, such as butylated hydroxy anisole or butylated hydroxy toluene alone or in mixtures.

The method steps for producing the molasses-fat blocks are identical with those set forth in Examples 1 and 2 above. One specific example involved mixing 99 pounds

molasses with 5 pounds of feed fat, resulting in approximately 100 pounds of finished feed supplement block of about 5 percent fat composition.

- 5 While specific examples of fats have been set forth, it is to be understood that a variety of other fats or other oils can be employed, including both hydrogenated and non-hydrogenated oils of animal and vegetable origin.

#### 10 EXAMPLE 4

##### Molasses-Fat-Urea Block

- Urea can be used as a source of nitrogen for ruminant animals, and each percent of urea of 45 percent nitrogen yields the approximate equivalent of 2.8 percent protein. By including from 3.56 percent to 14.2 percent urea in the blocks, a protein equivalent range of from 10 to 40 percent is included in the blocks. A preferred percentage range is a protein equivalent of from 20 to 25 percent, which is provided in the form of 7.1 to 8.9 percent urea.

- Combinations of molasses and urea alone have proven satisfactory in testing, but the most successful urea-containing blocks in feeding have proven to be blocks which also include some feed fat. One particular example included a mixture of 92 pounds of molasses, 5 pounds of feed fat, and 8.4 pounds of urea. This mixture was processed in the same manner as Example 1, and the resulting blocks totalled approximately 100 pounds, with about 5 percent fat and about 22 percent protein equivalent.

- 35 Throughout this specification, by protein equivalent materials we mean nitrogen containing materials such as urea or ammonium salts which may be utilised by the animal in an equivalent way to protein.

- 40 Another source of nitrogen which may be provided as a protein equivalent in the blocks is suitable ammonium salts, which may be

|    |           |                      |                |
|----|-----------|----------------------|----------------|
| 85 | Manganese | 4.54 to 18.16 mg/lb  | (0.001—0.004%) |
|    | Iodine    | 4.54 to 18.16 mg/lb  | (0.001—0.004%) |
|    | Zinc      | 4.54 to 18.16 mg/lb  | (0.001—0.004%) |
|    | Copper    | 4.54 to 13.62 mg/lb  | 0.001—0.003%   |
|    | Cobalt    | 4.54 to 9.08 mg/lb   | (0.001—0.002%) |
|    | Iron      | 181.6 to 363.2 mg/lb | (0.04 —0.08%)  |

- 90 The preferred vitamin additives are as follows:

|    |           |                                         |
|----|-----------|-----------------------------------------|
|    | Vitamin A | 5,000—20,000 International units/lb     |
|    | Vitamin D | 2,000— 6,000 International units/lb     |
| 95 | Vitamin E | 5—50 International units/lb (when used) |

- 100 Control of trace element and vitamin intake of the animals can conveniently be established either by increasing the salt content of the

provided with or without urea, and which preferably are included to provide a protein equivalent of from 10 to 40 percent, with an optimum protein equivalent in the range of from 20 to 25 percent.

#### EXAMPLE 5

##### Molasses-Fat-Protein Equivalent-Phosphate Block

In lick blocks for ruminant animals it is desirable to include some phosphate, and where the phosphate is included it is preferable to maintain a calcium-to-phosphorus ratio of 2 to 3 parts of calcium to each part of phosphorous. Calcium and phosphorous can be supplied by adding meat and bone meal, fish meal, calcium phosphates, including monocalcium, di-calcium, and tri-calcium phosphates, or by other means. Ammonium phosphate can be included as a source of nitrogen and of phosphorous, and calcium carbonate can be employed with added phosphates.

A specific example of a molasses-fat-protein equivalent (urea or ammonium salt or both)-phosphate block composition, including calcium, has been prepared in accordance with the steps set forth in Example 1, with a final block composition as follows: 2 to 3 percent calcium, 1 percent phosphorous, 2 to 5 percent salt, 5 percent fat, 20 to 25 percent protein equivalent, the remaining percentage molasses.

#### EXAMPLE 6

##### Molasses Block with Minor Elements and Vitamins Added

Although molasses is a rich source of trace elements, it is desirable to supplement any or all of the formulations set forth hereinabove with both trace elements and vitamins, the trace elements preferably being provided in chloride or sulfate form. A preferred range of content for trace elements is as follows:

blocks or by increasing the fat content thereof. As the salt increases the effect is self-limiting, but the animal may not secure the entire quantity of nutrients desired. By increasing the fat content of the blocks to about 10 percent, there is a satiating effect upon the animals, so that they have little or no desire to eat more than 1 to 3 pounds per day, depending on the size of the animals.

#### EXAMPLE 7

##### Addition of Kaolin, Bentonite or other Clay or Silicate Materials

It has frequently been the custom to add

from 0.5 to 2.0 percent kaolin or other clay or silicate material to the diet of the animal. This is particularly important under some feed-lot conditions, and of less importance in range-fed animals, such as cattle. Where conditions are such that it is desirable to include such materials in the feed, they may conveniently be included in the feed blocks of the present invention, without varying the method of production of the blocks. Thus, the procedure set forth in Example 1 may be employed. However, such materials are preferably provided in blocks which are completely supplemented, as for example the blocks of Example 6, the kaolin or similar material being stirred into the mixture while it is being heated. Due to the fact that such silicate materials hydrate taking up remaining water, the kettle must be dumped more rapidly after the vacuum is broken than with some of the other compositions according to the invention, to prevent the material from setting up in the kettle.

These inert additives are generally added to produce a certain amount of natural bulk in the animal diet, and they will hereinafter be collectively referred to as clay-like materials, it being understood that they include but are not limited to such clay-like materials as kaolin, bentonite, microsils "Microsil" (Registered Trade Mark), and other clay and silicate materials.

#### EXAMPLE 8

##### Molasses Block With Added Plant Feed Materials

Since the principal purpose of the molasses feed supplement lick blocks of the present invention is to furnish the animals a large amount of energy and growth materials in the smallest and most convenient possible package, it is normally not desirable to add conventional plant feed materials to the composition of the blocks. However, it is to be understood that such materials can be included within the scope of the invention, provided the percentage thereof is relatively low so as to not defeat the self-forming quality of the composition when it is poured into the molds. Normally, such added plant feed materials will be limited to a range of from 0.5 percent to 5 percent of the total block composition. Such added plant feed materials may include such things as ground grains, chopped or ground alfalfa, the meals such as coconut meal or seed meals including cottonseed, soya, sesame or linseed meals, or brewers dried grains, or chopped or ground straw, corncobs, cotton seed or other hulls, wheat or rice bran, or in general other plant components. Other additives to the blocks which are important to this invention are medicaments or other standard feed additives such as anthelmintics, bloat preventive agents, antibiotics, growth stimulating chemicals or phenothiazine.

#### WHAT I CLAIM IS:—

1. A rigid, vitreous animal lick block which comprises at least 50% of hard, solidified molasses as the primary structural and nutritional basis for the block and also comprises a medicament and/or a growth enhancing additive and/or another animal feed or supplement material.
2. A lick block according to claim 1 which includes up to 10% salt.
3. A lick block according to claim 1 or claim 2 which includes up to 30% fat.
4. A lick block according to any one of claims 1 to 3 which includes protein equivalent material equivalent to from 10% to 40% protein.
5. A lick block according to claim 4, wherein said protein equivalent material comprises urea.
6. A lick block according to claim 4 wherein said protein equivalent material comprises ammonium salt.
7. A lick block according to any one of the preceding claims, which includes up to 1% phosphorous in phosphate form.
8. A lick block according to claim 7, which includes calcium in an amount from 2 to 3 times the amount of phosphorous.
9. A lick block according to any one of the preceding claims, which includes at least one added trace element selected from manganese, iodine, zinc, copper, cobalt and iron.
10. A lick block according to any one of the preceding claims, which includes an anthelmintic, an antibiotic, phenothiazine or a bloat preventive.
11. A lick block according to any one of the preceding claims, which includes up to 5% plant feed material.
12. A lick block according to any one of the preceding claims, wherein said molasses is cane molasses.
13. The method of making a rigid, vitreous animal lick block, which method comprises the steps of heating a material comprising from 50% to 100% of molasses at a temperature ranging from 221°F. to 321°F. for a period of time ranging from 3 to 12 minutes, drawing a vacuum of at least 24 inches Hg. on said material, breaking said vacuum, introducing the material into moulding means to form said material into a block while it is still sufficiently hot to be formable, and allowing the material to cool until it hardens into a formed block.
14. The method according to claim 13 wherein said molasses is combined with a medicament and/or a growth enhancing additive and/or another animal feed or supplement material so that the resultant animal lick block is in accordance with claim 1.
15. The method according to claim 13 or claim 14 wherein said composition is stirred during said steps of heating and of drawing the vacuum.



from 0.5 to 2.0 percent kaolin or other clay or silicate material to the diet of the animal. This is particularly important under some feed-lot conditions, and of less importance in range-fed animals, such as cattle. Where conditions are such that it is desirable to include such materials in the feed, they may conveniently be included in the feed blocks of the present invention, without varying the method of production of the blocks. Thus, the procedure set forth in Example 1 may be employed. However, such materials are preferably provided in blocks which are completely supplemented, as for example the blocks of Example 6, the kaolin or similar material being stirred into the mixture while it is being heated. Due to the fact that such silicate materials hydrate taking up remaining water, the kettle must be dumped more rapidly after the vacuum is broken than with some of the other compositions according to the invention, to prevent the material from setting up in the kettle.

These inert additives are generally added to produce a certain amount of natural bulk in the animal diet, and they will hereinafter be collectively referred to as clay-like materials, it being understood that they include but are not limited to such clay-like materials as kaolin, bentonite, microsil "Microsil" (Registered Trade Mark), and other clay and silicate materials.

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#### WHAT I CLAIM IS:—

1. A rigid, vitreous animal lick block which comprises at least 50% of hard, solidified molasses as the primary structural and nutritional basis for the block and also comprises a medicament and/or a growth enhancing additive and/or another animal feed or supplement material.

2. A lick block according to claim 1 which includes up to 10% salt.

3. A lick block according to claim 1 or claim 2 which includes up to 30% fat.

4. A lick block according to any one of claims 1 to 3 which includes protein equivalent material equivalent to from 10% to 40% protein.

5. A lick block according to claim 4, wherein said protein equivalent material comprises urea.

6. A lick block according to claim 4 wherein said protein equivalent material comprises ammonium salt.

7. A lick block according to any one of the preceding claims, which includes up to 1% phosphorous in phosphate form.

8. A lick block according to claim 7, which includes calcium in an amount from 2 to 3 times the amount of phosphorous.

9. A lick block according to any one of the preceding claims, which includes at least one added trace element selected from manganese, iodine, zinc, copper, cobalt and iron.

10. A lick block according to any one of the preceding claims, which includes an anthelmintic, an antibiotic, phenothiazine or a bloat preventive.

11. A lick block according to any one of the preceding claims, which includes up to 5% plant feed material.

12. A lick block according to any one of the preceding claims, wherein said molasses is cane molasses.

13. The method of making a rigid, vitreous animal lick block, which method comprises the steps of heating a material comprising from 50% to 100% of molasses at a temperature ranging from 221°F. to 321°F. for a period of time ranging from 3 to 12 minutes, drawing a vacuum of at least 24 inches Hg. on said material, breaking said vacuum, introducing the material into moulding means to form said material into a block while it is still sufficiently hot to be formable, and allowing the material to cool until it hardens into a formed block.

14. The method according to claim 13 wherein said molasses is combined with a medicament and/or a growth enhancing additive and/or another animal feed or supplement material so that the resultant animal lick block is in accordance with claim 1.

15. The method according to claim 13 or claim 14 wherein said composition is stirred during said steps of heating and of drawing the vacuum.



16. The method according to any one of claims 13 to 15 wherein said temperature is 270°F.
- 5 17. The method according to any one of claims 13 to 16, wherein said period of time ranges from 5 to 7 minutes.
18. The method according to any one of claims 13 to 17 wherein said vacuum is at least 29 inches of mercury.
- 10 19. The method according to any one of claims 13 to 18 wherein said vacuum is maintained for at least one minute.
20. The method of making an animal lick block according to claim 13 and substantially as described with reference to any one of the Examples.
21. An animal lick block whenever produced by the method according to any one of claims 13 to 20.
22. An animal lick block according to claim 1 to claim 21 substantially as described in any one of the Examples.
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