United States Patent

Merkt et al.

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[54] SPERM TRANSFER METHOD

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[51] **Int. Cl.** **A61d 07/02**

[58] **Field of Search** 128/1.3, 1.4, 260, 261, 264

[56] **References Cited**

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[57] **ABSTRACT**

Animal sperm is inserted into geletin capules and freeze-sealed with a plug of felt-like material extending across the open end portion of each capsule, the peripheral portion of each plug extending slightly beyond the external wall of the capsule. Prior to sealing, each plug is wetted at its under surface with a sterile liquid and the seal is obtained by freezing. Each plug has a ferromagnetic coat on its upper surface. The capsules are placed in serial array, in a storage tube having a closed end. A ferromagnetic cap having a clip extending therefrom is placed on and into the open end of the tube with the clip extending thereinto and bearing against the internal wall thereof, in which condition the capsules are placed in a freezer-container. In use, a tube is removed from the container and a rod having a permanent magnet at one end is used to remove the cap and also to remove a capsule therefrom. The rod and capsule are then placed in a pipette having an open end and a radially inwardly extending flange providing a smaller opening at the other end thereof. The pipette is inserted into a female animal and the capsule is moved by, said flange. When body heat melts the liquid, the pipette, rod and closure are withdrawn from the animal. The free surface of the coat may be labeled with significant indicia.

6 Claims, 4 Drawing Figures

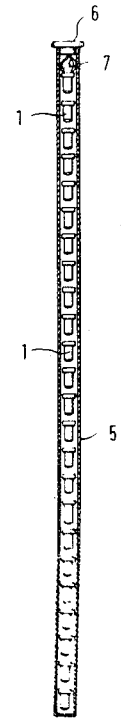


Fig.1

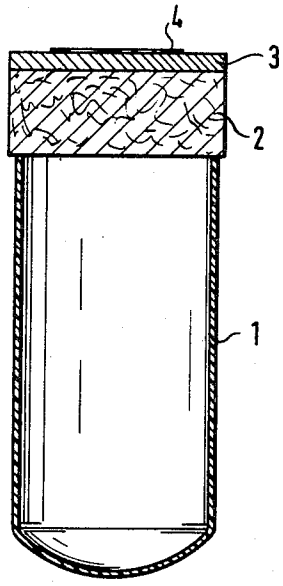


Fig.2

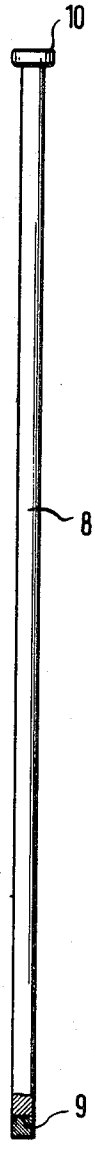


Fig.3

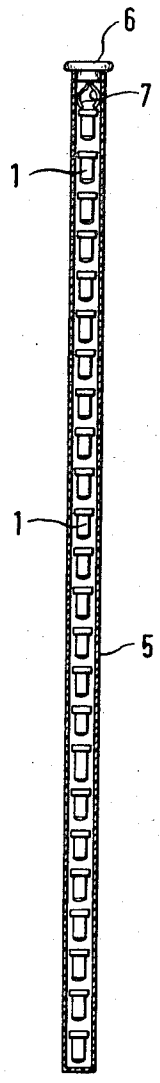
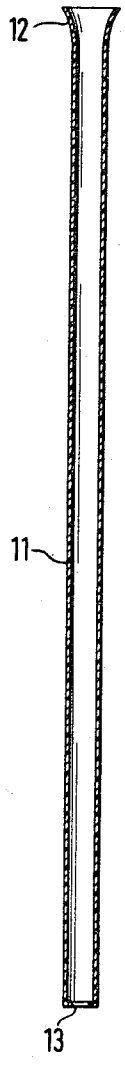


Fig.4



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SPERM TRANSFER METHOD

DISCLOSURE OF THE INVENTION

The present invention relates to a new and improved method of inseminating domestic animals, in particular cattle, by using a pipette made of synthetic material for applying capsules filled with deep-frozen sperm.

Hitherto, the sperm filled capsules taken by means of a pincette or a pair of pincers from a deep-freeze storage container were placed into the synthetic pipette consisting of a long thin tube to be introduced into the body of the animal. Most of the capsules made of gelantine are, due to their smoothness, hard to get hold of and drop often to the floor when transferred from the storage container into the synthetic pipette; they become thus infected and contaminated or must be discarded on account of the impurities that have collected thereon. This constitutes a handicap in negatively affecting the performance and the results of the artificial insemination. Additionally, the loss of any apportioned quantity of sperm of high quality donator stock constitutes a considerable financial drawback.

It is therefore a primary object of the present invention to provide a new and improved method of inseminating cattle or other domestic animals by applying capsules filled with deep-frozen sperm to the animal body by means of a synthetic pipette which method assuredly overcomes the aforementioned disadvantages, and whereby desirable preconditions are established for guaranteeing the success of the artificial insemination.

According to the present invention several capsules which have been filled with deep-frozen sperm and are sealed by a plug provided with a ferro-magnetic coat, are stored one above another in a tube made of synthetic material, which tube is inserted into a deep-freeze storage container. In order to apply a capsule to the animal, the individual capsules are taken from the synthetic tube or tubelet by means of a rod on which end there is mounted a permanent magnet. Then they are inserted into a synthetic pipette to be introduced into the female animal.

By this new method the capsules containing the sperm are taken from the storage container only by means of the adhesive force exerted by the permanent magnet attached to one end of the rod. Also by this magnetic rod the capsules are inserted into the synthetic pipette and applied by means of said same rod from the pipette into the body of the animal. Therefore the capsules will remain entirely uncontaminated. This could not always be obtained with prior art methods, even when using the greatest precaution.

The ferro-magnetic coat is preferably applied on a plug made of felt. It is recommended to wet said felt plug with a sterile liquid and to maintain it on the aperture of the capsule by means of a freezing process, whereby it congeals thereon because the capsule contents themselves undergo deep-freezing. This solidification due to congelation provides the advantage that maintenance and sealing of the capsule is achieved without taking recourse to glues or other substances which might adversely affect the sperm. The felt plug fixedly secured to the opening of the capsule by congealing the liquid is dislodged, after the capsule has been applied to the animal, on account of the warmth emanating from the body of the animal. Besides, the

felt plug closes the capsule so securely that neither harmful matter or germs can enter from the storage container into the capsule nor can sperm leave the capsule and adhere to other capsules.

In accordance with another feature of the present invention the plug made preferably of felt or similar material is constructed such that it functions as a piston transferring the pressure into the pipette, thus advancing the capsule. Since the plug completely obturates the lumen of the pipette, it also prevents at the same time that the sperm contained in the capsule or that the female animal itself, receiving said sperm, is contaminated or infected. Thus, the important advantage will obtain that the rod carrying the magnet need not be desinfected in the intervening time.

To permit the individual capsules to be taken in a simple manner from the synthetic tubelets serving as storage it is preferable to provide said tubelet with a closing ferro-magnetic cover which can be lifted off easily by the magnet of the rod. A particularly simple and inexpensive cover of the storage tubelet is achieved if a customary sample bag clip made of ferro-magnetic material, e.g. brassed sheet metal, is used as cover; both legs thereof press with a given amount of tension against the inner wall of the storage tubelet.

It is possible to print on the ferromagnetic coat of the obturating plug indications to identify each individual sperm capsule in a simple and clear way or to attach a respective label to said coat. Such indications are still readable after completion of the insemination process.

The invention is illustrated and further explained in connection with the appended drawings showing an embodiment for putting into operation the method according to the invention. In the drawings

FIG. 1 is a longitudinal section of a capsule at an enlarged scale;

FIG. 2 is an elevational view of a rod carrying a permanent magnet shown in section;

FIG. 3 is a partial sectional view of a storage tube made of synthetic material, and

FIG. 4 is a sectional view of a pipette made of synthetic material.

Referring to FIG. 1 of the drawings a capsule 1 containing the deep-frozen sperm is made of gelantine or similar material and is closed by a cylindrical plug 2 preferably made of felt or comparable material. The plug 2 is wetted with a sterile liquid, e.g. a sperm diluent and simply held in position on the capsule aperture by a freezing process such that no glues or similar substances are required, which might adversely affect the sperm. On the upper side of the cylindrical plug 2 there is applied a ferro-magnetic coat 3 consisting of a thin iron sheet. On its surface the iron sheet 3 carries a print 4 with indications of control data, numbers or the like.

As is illustrated in FIG. 3 of the drawings, the individual capsules 1 filled with sperm are placed one above another in a small storage tube 5 made e.g. of synthetic material, which tube is positioned in a container filled with freezing media such as liquid nitrogen (not shown in the drawings). The storage tube 5 is sealed by means of a cover 6 for which a clip customarily employed for closing sample bags or the like is used, both legs 7 of which press with a certain amount of tension against the inner wall of the storage

tube 5. Sample bag clips of this type are customarily made of brassed iron sheet, they are, therefore, ferromagnetic. The pressure of the legs 7 of the clip against the inner walls of the tube 5 is sufficiently light, so that the magnet 9 located at the end of the rod 8 can easily overcome this pressure and raise the cover 6 from the tube 5.

For inserting the sealed capsules 1 filled with sperm into the storage tube 5 as well as for retrieving them therefrom and placing said capsules into a pipette 11, shown in FIG. 4, use is made of a rod 8, illustrated in FIG. 2, which rod carries on one of its ends a small permanent magnet 9 and on its other end a handle 10.

The pipette 11 is made from synthetic or plastic material and has a length which is necessary for the inseminating process. The upper end is provided with a funnel-shaped widening 12, by which the insertion of the capsules 1 is facilitated. At the lower end of the pipette 11 there is an inwardly directed flange 13 which is of such size that it permits the passage of the capsule 1 while serving as a stop for the plug 2.

For the insemination process there is first opened the storage tube 5 by means of the rod 8, by having the permanent magnet 9 remove the cover 6 from the aperture of the storage tube 5. After disengaging the cover 6 from the magnet 9 the rod 8 is introduced into the storage tube 5 in a manner that the ferro-magnetic coat 3 of the uppermost capsule 1 adheres to the permanent magnet 9. When lifting the rod 8 the capsule 1 is also lifted out in order to be introduced into the pipette 11.

The capsule 1 is securely guided by adhering to the magnet 9 attached to the rod 8 when introduced into the pipette due to the fact that the cylindrical felt plug 2 has a diameter such that it may be caused to slide within and through the pipette similar to a piston. By advancing the rod 8 the capsule 1 is moved to a radially inwardly directed flange as shown in FIG. 4, at the lower end of pipette 11 and after the introduction of said pipette 11 into the female animal the sperm capsule 1 is deposited, whereas the felt plug 2 is retained in the pipette 11 by the flange. Due to the body heat of the animal the capsule 1 is melted and the rod 8 with the permanent magnet 9 can be moved to a position most suitable for the insemination. The capsule 1 is made of a very fine and thin gelatine mass, so that it is melted by the body heat of the animal as quickly as the frozen sterile liquid with which the plug 2 is saturated. The short melting time depends obviously on the actual body heat which is variable. Practical experimentation has shown that this procedure is fully effective. Due to the inner flange 13 of the pipette 11 the plug 2 is retained in the pipette and can be retrieved, as the case may be, from said pipette for examining and verifying the indicatings 4 of the plug 2.

By using magnetic forces in the manner described the capsules containing deep-frozen sperm are safely inserted to the storage tube 5 and to the pipette 11 as well as applied to the animal without any manual contact of the operator. Therefore important advantages are achieved by the present invention.

Other modes of applying the principle of our invention may be employed instead of those explained; change being made as regard the method herein disclosed, provided the step or steps stated by any of the following claims or the equivalent of such stated steps be employed.

Our claims are:

1. A sperm transfer method, comprising the steps of inserting sperm into capsules sealing the capsule with a plug provided with a ferromagnetic coat, gathering a plurality of said capsules in a storage tube, inserting said storage tube into a container for extremely low temperatures, transferring said storage tube to another location, introducing into said storage tube a rod upon an end of which is mounted a permanent magnet, drawing capsules singly from said storage tube and inserting each capsule into pipette by said magnet, introducing said pipette into female animal and discharging a capsule from said pipette by said rod.

2. A method according to claim 1, comprising wetting the plug before sealing the filled capsule with a liquid, and then cooling the storage tube containing a plurality of said capsules in a deep-freezing-process, whereby said plug is tightly frozen on to said capsule.

3. A method according to claim 1, comprising guiding the plug of said capsule like a piston in said pipette.

4. A method according to claim 1, comprising closing the storage tube after receiving a plurality of capsules by a ferromagnetic cover.

5. A method according to claim 1, comprising closing the storage tube filled with said capsules by a bag clip.

6. A method according to claim 1, comprising attaching indications to identify each individual sperm on the ferromagnetic coat of the plugs of the single capsules.

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