

Kit for the preparation of a vaccinating agent

The present invention relates to a kit for the preparation of a vaccinating agent, a use of the kit for preparing a vaccinating agent, a use of at least two starting materials for preparing a vaccinating agent and a process for providing a vaccinating agent.

The present invention relates in particular to the manufacture and provision of vaccinating agents, particularly in the veterinary medical field. Primarily, the present invention relates to vaccinating agents for immunising pigs against Porcine Circovirus, particularly type 2, also known as Porcine Circovirus Disease or PCVD, and/or against bacteria of the strain *Mycoplasma hyopneumoniae*, also known as Enzootic Pneumonia or EP.

It is known that the above-mentioned diseases can be prevented by immunisation with vaccines. Vaccinating agents are usually provided for injection and have to be correspondingly sterile. Moreover, each individual injection causes stress to the creature being treated and for this reason the number of vaccination processes should be kept to a minimum.

One known possibility for reducing the number of vaccination processes are so-called combined vaccinations by which immunisation against different diseases can be provided in just a few or even just one session. However, a combined vaccination is often not possible as a result of incompatibilities of different vaccines or components thereof with one another. Even if an at least short-time compatibility can be achieved, these combination vaccines have to be produced on site. In the veterinary medical field, in particular, the vaccines then have to be prepared and/or administered outdoors. A problem here is that the combination vaccine may become contaminated, for example with pathogens, particularly if a mixing vessel has to be punctured several times.

Object of the ~~present invention~~ embodiments disclosed herein is to provide a kit for preparing a vaccinating agent, a use of this kit for preparing a vaccinating agent, a use of two starting materials for preparing a vaccinating agent and a process for providing a vaccinating agent by which a vaccinating agent can be produced, even from starting materials which are only briefly stable with one another, by the simplest possible method, which is not prone to errors and is at the same time hygienic.

The above problem is solved by a kit for preparing a vaccinating agent according to claim 1, by a use of such a kit for preparing a vaccinating agent according to claim 55, by a use of at least two starting materials for preparing a vaccinating agent according to claim 56 or by a process for providing a vaccinating agent according to claim 116. Advantageous embodiments are the subject of the sub-claims.

~~The In a first aspect the present invention disclosure~~ relates to a kit for preparing a vaccinating agent, particularly for preparing a vaccinating agent for use in immunising against the disease Porcine Circovirus Disease "PCVD" and/or Enzootic Pneumonia "EP" or against infections with Porcine Circovirus, particularly type 2, and/or *Mycoplasma hyopneumoniae*.

The kit according to the ~~invention disclosure~~ comprises a first starting material and a second starting material that is different from the first. A starting material for the purposes of the

present ~~invention-disclosure~~ is preferably any source material, particularly a vaccine, a source material comprising a vaccine and/or a component or source material for a vaccinating agent, preferably an antigen or a composition containing an antigen.

5 Moreover, the kit comprises a first container that is only partly filled with the first starting material and a second container holding the second starting material.

A container for the purposes of the present ~~disclosure invention~~ is preferably a structure enclosing a volume, preferably configured to receive a liquid, particularly a vessel,
10 a bottle, a bag or the like.

The kit further comprises an adapter device for establishing a fluid connection, wherein the fluid connection can be established between the first and second containers. It is also preferable that the adapter device should be configured to establish a fluid connection between the interiors of the first container and the second container.
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Moreover in the proposed kit at least one of the containers is closed off by a closure device on the operating side. Preferably, both containers are closed off by a closure device on the operating side. Preferably, an airtight and/or sterile closure is provided. In particular this may be a seal, a rubber stopper or the like, wherein the closure device
20 can preferably be penetrated and/or pierced, particularly reversibly. In this way the containers, i.e. at least one of the containers, can be sealed in sterile manner.

It is envisaged that the second container can be connected to the first container by means of the adapter device, when the closure device is pierced for the first and/or only time, such that the second starting material enters the first container, particularly is transported therein, and there forms the vaccinating agent with the first starting material. The closure device or closure devices are thus preferably embodied to be penetrated or pierced by means of the adapter device. The adapter device is preferably configured to be able to penetrate and/or pierce the closure device or closure devices. In this way a fluid connection can be provided between the first and second containers.
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In a first aspect, the present disclosure relates to a kit for preparing a vaccinating agent, particularly a kit for preparing a vaccinating agent for use in immunisation against the disease Porcine Circovirus Disease "PCVD" and/or Enzootic Pneumonia "EP", the kit comprising a first starting material, a second starting material different from the first, a first container only partly filled with the first starting material, a second container comprising the second starting material and preferably an adapter device for providing a fluid connection between the first and second container, wherein at least one of the containers is closed off on the operating side with a closure device and the second container is connectable to the first container by means of the adapter device by piercing the closure device for the first and/or only time, such that the second starting material enters the first container and there forms the vaccinating agent with the first starting material.
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With the kit according to the ~~disclosure invention~~ it is thus possible to prepare a vaccinating agent from two starting materials with only two containers and an adapter device, particularly for use in immunising against the diseases caused by infections with Porcine Circovirus and/or Mycoplasma hyopneumoniae, preferably for use in immunising against the diseases caused by infections with Porcine Circovirus and Mycoplasma hyopneumoniae. The kit also avoids the use of other incompatible starting materials, particularly by presenting the starting materials and containers in kit form.
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In a second aspect, the present disclosure relates to use of a kit, particularly as defined above, for producing and/or preparing a vaccinating agent, preferably for, in particular, simultaneous immunisation against the disease Porcine Circovirus Disease "PCVD" and/or Enzootic Pneumonia "EP".

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Advantageously, the vaccinating agent may be formed in the only partly filled first container, avoiding the need for additional containers and/or additional adapter devices. This makes the application as simple as possible. In addition, the use of materials is minimised as the number of components required is reduced to a minimum.

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Also it is particularly advantageous that simply penetrating or piercing the closure device, for the first or only time, is enough to produce the vaccinating agent. In fact, this

avoids foreign substances or pathogens getting into the vaccinating agent during multiple penetration or piercing of the closure device.

In the present ~~disclosure invention~~, for reasons of clarity, a distinction is made between vaccines as possible constituents of one or more starting materials and the vaccinating agent as the product prepared from the starting materials.

Thus, the term "vaccinating agent", even when it also denotes a vaccine, preferably denotes the end product that is preferably produced or prepared from the two starting materials and/or is used for the treatment. Particularly preferably, the vaccinating agent is a combination vaccine, preferably containing at least two vaccines different from one another or at least two antigens different from one another or two compositions containing antigen, where the compositions containing the antigen differ at least in the antigens present. The term "vaccines", even when it refers to vaccinating agents, preferably refers to starting materials or constituents thereof, particularly antigens or antigen-containing compositions. By an "antigen" or an "antigen-containing composition" is preferably meant a substance or a composition containing the substance which can elicit an immune response in an animal after administration or can intensify an existing immune response. The differentiation between the terms "vaccinating agent" and "vaccine" thus serves mainly only to clarify or to distinguish the product from possible components of one or more of the starting materials. Consequently it is possible to replace the term "vaccinating agent" by the term "vaccine" or vice versa.

A kit, under the terms of the present ~~disclosure invention~~, is in particular a combination and/or system comprising the first container, the second container and preferably the adapter device, which form components of the kit. The components of the kit are preferably sold as a set, particularly in a combined package or the like. However, it is also possible for the components specified to form a loose combination for joint use. A common or linking component may be provided, for example a common instruction manual, recommendations for use, references in the captions on one or more of the components of the kit or the like.

Another ~~aspect-embodiment~~ of the present ~~disclosure invention~~ that can also be implemented independently relates to the use of a preferably proposed kit for the preparation and/or provision of a vaccinating agent, particularly for immunising against the disease(s) Porcine Circovirus Disease "PCVD" and/or Enzootic Pneumonia "EP" or infections with Porcine Circovirus and/or infection with bacteria of the Mycoplasma strain, particularly Mycoplasma hyopneumoniae, preferably for immunisation against the diseases Porcine Circovirus Disease "PCVD" and/or Enzootic Pneumonia "EP" or against infections with Porcine Circovirus, particularly Porcine Circovirus type 2 and infection with bacteria of the Mycoplasma strain, particularly Mycoplasma hyopneumoniae.

Another ~~aspect-embodiment~~ of the present ~~disclosure invention~~ that can also be implemented independently relates to the use of at least two starting materials for preparing a vaccinating agent, particularly for simultaneous immunisation, in particular, against the disease(s) Porcine Circovirus Disease "PCVD" and/or Enzootic Pneumonia "EP", preferably for in particular simultaneous immunisation against the diseases Porcine Circovirus Disease "PCVD" and Enzootic Pneumonia "EP", or against infections with Porcine Circovirus, particular-

ly Porcine Circovirus Type 2 and infection with bacteria of the Mycoplasma strain, particularly Mycoplasma hyopneumoniae, wherein the vaccinating agent is prepared using starting materials in containers and an adapter device. A kit may be used as proposed.

5 It is also envisaged that a first starting material is used in a first container only partly filled with the first starting material and a second starting material that is different from the first is used in a second container holding the second starting material and an adapter device is used which is configured so as to establish a fluid connection between the first and second containers. At least one of the containers is closed off by a
10 closure device on its operating side. A fluid connection between the first and second containers is produced by means of the adapter device when the closure device is penetrated for the first and/or only time, in order to transfer the second starting material through the adapter device and closure device into the first container and produce the vaccinating agent in the first container.

15 In a third aspect, the present disclosure relates to use of at least two starting materials for producing a vaccinating agent, preferably for, in particular, simultaneous immunisation against the disease Porcine Circovirus Disease "PCVD" and/or Enzootic Pneumonia "EP" in pigs, in which, in order to produce the vaccinating agent, the starting materials are placed in containers and used with an adapter device, particularly using a kit as defined above, using a first starting material in a first container only partly filled with the first starting material and a second starting material different from the first in a second container comprising the second starting material, and an adapter device designed to provide a fluidic connection between the first and second container, at least one of the containers being closed off on the operating side with a closure device and forming with the adapter device, when the closure device is pierced for the first and/or only time, a fluid connection between the first and second container, in order to transfer the second starting material through the adapter device and the closure device into the first container and produce the vaccinating agent in the first container.

30 Another aspect ~~embodiment~~ of the present ~~disclosure invention~~ that can also be implemented independently relates to a process for preparing a vaccinating agent from a first starting material and a second starting material different from the first, particularly for especially simultaneous immunisation against the disease Porcine Circovirus Disease "PCVD" and/or Enzootic Pneumonia "EP", preferably for particularly simultaneous immunisation against the diseases Porcine Circovirus Disease "PCVD" and Enzootic Pneumonia "EP". The vaccinating agent may be prepared using a kit as proposed.

40 Between a first container only partly filled with the first starting material and a second container holding the second starting material a fluid connection is established by an adapter device, such that the fluid connection between the first and second containers is established by means of the adapter device when at least one closure device, which preferably closes off at least one of the containers and is provided on the operating side, is penetrated or pierced for the first and/or only time by the adapter device. The
45 second starting material is transferred or conveyed through the adapter device and the closure device into the first container. In the first container, the vaccinating agent is formed from the first starting material and the second starting material.

50 In a fourth aspect, the present disclosure relates to a process for preparing a vaccinating agent from a first starting material and with a second starting material different from the first, preferably for, in particular, simultaneous immunisation against the disease Porcine Circovirus Disease "PCVD" and/or Enzootic Pneumonia "EP", particularly with a kit as defined above, wherein between a first container only partly filled with the first

5 starting material and a second container comprising the second starting material a fluid connection is formed by an adapter device, such that, by means of the adapter device, when at least one closure device provided on the operating side of at least one of the containers is pierced for the first and/or only time a fluid connection is formed between the first and second container, and the second starting material is conveyed through the adapter device and the closure device into the first container, and in the first container the vaccinating agent is formed from the first and second starting material.

10 Preferably, the first and/or second starting material is or comprises a vaccine, an antigen and/or an antigen-containing composition. Moreover, the first starting material may differ from the second starting material. The first starting material may thus be or comprise a first vaccine, a first antigen and/or a composition containing a first antigen and the second starting material may be or comprise a second vaccine, different from the
15 the antigen of which differs from that of the first antigen-containing composition. Preferably, the first vaccine and the second vaccine, or the first antigen and the second antigen, or the compositions containing the various antigens are for particularly simultaneous immunisation against various diseases or pathogens such as for example against the disease Porcine Circovirus Disease "PCVD" and Enzootic Pneumonia
20 "EP", or for immunisation against Porcine Circovirus, preferably Porcine Circovirus type 2 and against Mycoplasmas, preferably against Mycoplasma hyopneumoniae. This makes it possible to produce a combination vaccine. The starting materials may contain other substances apart from vaccines, particularly water, adjuvants and/or excipients.

duced or designed so that 1 ml of the vaccine corresponds to a dose of 1 and/or one (single) dose. In particular the Circovirus vaccine may contain ORF2 protein in amounts of more than 2 µg/ml, preferably more than 4 µg/ml and/or less than 150 µg/ml, preferably less than 60 µg/ml, 50 µg/ml, 40 µg/ml, 30 µg/ml or 25 µg/ml, particularly less than 20 µg/ml. This helps to ensure reliable administration.

The Mycoplasma vaccine, if it contains inactivated Mycoplasma bacteria, preferably inactivated Mycoplasma hyopneumoniae bacteria, preferably contains between 10^3 and 10^9 colony forming units (CFU), preferably between 10^4 and 10^8 (CFU), more preferably between 10^5 and 10^6 (CFU) per dose to be administered, the corresponding CFU being selected before the inactivation of the bacteria. The Mycoplasma vaccine is preferably prepared or designed such that 1 ml of the vaccine corresponds to a dose of 1 and/or one (single) dose. In particular, the mycoplasma vaccine may contain more than 10^3 CFU/ml, preferably more than 10^4 CFU/ml, particularly more than 10^5 CFU/ml and/or less than 10^9 CFU/ml, preferably less than 10^8 CFU/ml, particularly less than 10^7 CFU/ml or 10^6 CFU/ml inactivated Mycoplasma bacteria, preferably inactivated Mycoplasma hyopneumoniae bacteria, particularly before the inactivation of the bacteria.

At least one of the starting materials and/or the vaccinating agent may contain an adjuvant, preferably a polymeric adjuvant, particularly carbomer. Preferably, at least or exactly one of the two starting materials, preferably both starting materials, contain a quantity of adjuvant of 500 µg to 5 mg, preferably 750 µg to 2.5 mg, more preferably about 1 mg of adjuvant per dose to be administered. The starting materials are preferably prepared or designed such that 1 ml of the respective starting material corresponds to a dose of 1 and/or one (single) dose. The use of an adjuvant, preferably a polymeric adjuvant, such as carbomer, for example, has proved advantageous in terms of the efficiency of the immunisation or its duration of effect. The use of alternative and/or additional adjuvants is not excluded, however.

It has also proved advantageous if the total volume of the first container exceeds the volume of the first starting material at least by the volume of the second starting material, particularly by more than 2%, preferably more than 5%, particularly more than 8%. This ensures that the first container has sufficient capacity for the second starting material. In addition, the volume of the first container, which exceeds the sum of the volumes of the first and second starting material, ensures effective mixing of the starting material, particularly when the first container is moved after the transfer of the second starting material into the first container.

It is thus preferable on the one hand that the total volume of the first container should exceed the sum of the volumes of the starting materials. On the other hand, the first container is moved during and/or after the transfer of the second starting material into the first container, to achieve or speed up homogeneous mixing and/or reaction.

According to another ~~aspect-embodiment~~ of the present ~~disclosureinvention~~, the first container may be used for installation in or use with an injection device. In particular, this is an injection device for multiple use, such as for example an injection gun, a pressure injection and/or a self-filling syringe as used for example for vaccinating larger herds of animals. In this way, the number of penetrations of the closure device of the first container can be minimised.

In particular, the number of penetrations can be reduced to two, namely one penetration for the preparation process and a second penetration for drawing up the vaccinating agent. Particularly advantageously, the adapter device may be used for connection to the injection device, thus reducing the number of penetrations to one.

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The kit according to the disclosure invention may comprise an injection device or be associated with one such. In particular, an opening, a flange or other connecting or closure element of the first container and/or the adapter device may be configured so as to allow direct use in or with an injection device. Moreover, the opening, the flange or the other connecting and/or closure element may be specifically designed for connection to a particular injection device. Once again this decreases the likelihood of incorrect use, particularly of incorrect amounts of active substance or methods of administration.

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One or more of the containers may contain, in addition to the respective starting material, a gas, particularly a protective gas, thus making it possible to improve the long-term stability of the respective starting material. Moreover, the adapter device may be embodied to transfer the gas from the first container into the second container when the second starting material is transferred from the second container into the first container, particularly with the exclusion of the surrounding atmosphere. Thus ensures that effects on one or more of the starting materials and/or the vaccinating agent as a result of oxidation or the like, in particular, is ruled out and/or a pressure equalisation is made possible.

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Further aspects, details, features, properties and advantages of the present disclosure invention will become apparent from the claims and the graphic representation as well as the following description of a preferred embodiment of the proposed kit for preparing a vaccinating agent. In the drawings:

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Fig. 1 shows a first container, partly filled with a first starting material;

Fig. 2 a second container with a second starting material;

Fig. 3 an adapter device for fluidically connecting the containers;

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Fig. 4 a second container with adapter device inserted;

Fig. 5 a first and a second container connected by an adapter device;

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Fig. 6 a first container with vaccinating agent;

Fig. 7 an injection device with first container attached.

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In the Figures, the same reference numerals are used for identical or similar parts, where corresponding or comparable properties and advantages are obtained even if the description is not repeated.

Fig. 1 shows a first container 1 with a wall 2 delimiting a volume. The container 1 comprises an opening region 3 which may have a flange 4, for example an annular shoulder.

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