SUMMARY OF PRODUCT CHARACTERISTICS

1. NAME OF THE VETERINARY MEDICINAL PRODUCT

Improvac Solution for Injection for Pigs

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

One dose (2 ml) contains:

Active substance:
Gonadotropin releasing factor (GnRF) analogue-protein conjugate min. 300 µg.
(a synthetic peptide analogue of GnRF conjugated to diphtheria toxoid)

Adjuvant:
Diethylaminoethyl (DEAE)-Dextran, an aqueous, non-mineral oil-based adjuvant 300 mg.

Excipient:
Chlorocresol 2.0 mg.

For the full list of excipients, see section 6.1.

3. PHARMACEUTICAL FORM

Solution for injection.
Colourless to yellowish viscous solution.

4. CLINICAL PARTICULARS

4.1 Target species

Male pigs (from 8 weeks of age). Female pigs (from 10 weeks of age).

4.2 Indications for use, specifying the target species

Male pigs:
Induction of antibodies against GnRF to produce a temporary immunological suppression of testicular function. For use as an alternative to physical castration for the reduction of boar taint caused by the key boar taint compound androstenone, in entire male pigs following the onset of puberty.
Another key contributor to boar taint, skatole, may also be reduced as an indirect effect. Aggressive and sexual (mounting) behaviours are also reduced.

The onset of immunity (induction of anti-GnRF antibodies) can be expected within 1 week post second vaccination. Reduction of androstenone and skatole levels has been demonstrated from 4 to 6 weeks post second vaccination. This reflects the time needed for clearance of boar taint compounds already present at the time of vaccination as well as the variability of response between individual animals.
Reduction of aggressive and sexual (mounting) behaviours can be expected from 1 to 2 weeks post second vaccination.

Female pigs:
Induction of antibodies against GnRF to produce a temporary immunological suppression of ovarian function (suppression of oestrus) in order to reduce the incidence of unwanted pregnancies in gilts intended for slaughter, and to reduce the associated sexual behaviour (standing oestrus).

The onset of immunity (induction of anti-GnRF antibodies) can be expected within 1 week post second vaccination. Reduction of sexual behaviour (standing oestrus) can be expected from 1 to 2 weeks post second vaccination. The duration of immunological suppression of ovarian function has been demonstrated for 9 weeks after the second vaccination.

4.3 Contraindications

Do not use in breeding animals. Please also refer to section 4.7.

4.4 Special warnings for each target species

Please refer to section 4.3 and section 4.7.

Vaccinate healthy animals only.

4.5 Special precautions for use

i) Special precautions for use in animals

Improvac has been shown to be safe in male and female pigs from 8 weeks of age onwards. In male pigs, the recommended time for slaughter is 4 to 6 weeks after the final injection. If male pigs cannot be slaughtered within this recommended period, the available trial data support that pigs may still be sent for slaughter up to 10 weeks after the final injection with minimal risk of boar taint. An increasing proportion will return to normal function after this time. As skatole levels are not fully dependent on sexual status, both dietary and hygiene management procedures to reduce skatole levels are also important. In female pigs, the duration of immunological suppression of ovarian function has been demonstrated for 9 weeks after the second vaccination. An increasing proportion of female pigs may be expected to return to normal function after this time.

ii) Special precautions to be taken by the person administering the veterinary medicinal product to animals

Accidental self-injection may produce similar effects in people to those seen in pigs. These may include a temporary reduction in sexual hormones and reproductive functions in both men and women and an adverse effect on pregnancy. The risk of these effects occurring is greater after a second or subsequent accidental injection than after a first injection.

Special care should be taken to avoid accidental self-injection and needle stick injury when administering the veterinary medicinal product. The veterinary medicinal product must only be used with a safety vaccinator, which has a dual

safety system providing both a needle guard and a mechanism to prevent accidental operation of the trigger.

The veterinary medicinal product must not be administered by pregnant women or those who may be pregnant at that time.

In case of eye contact, rinse immediately with copious amounts of water. In case of skin contact, wash immediately with soap and water.

Advice to the user in the event of accidental self-injection:
Accidental injection/self-injection may result in severe pain and swelling, particularly if injected into a joint or finger, and in rare cases could result in the loss of the affected finger if prompt medical attention is not given.
In the event of accidental self-injection, wash the injury thoroughly with clean running water. Seek prompt medical advice even if only a very small amount is injected and take the package leaflet with you. If pain persists for more than 12 hours after medical examination, seek medical advice again. Do not administer the veterinary medicinal product in the future.

Advice to the physician:
Accidental self-injection could temporarily affect reproductive physiology of both men and women and may adversely affect pregnancy. If self-injection with Improvac is suspected, reproductive physiology should be monitored by assay of testosterone or oestrogen levels (as appropriate). The risk of a physiological effect is greater after a second or subsequent accidental injection than after a first injection. Clinically meaningful suppression of gonadal function should be managed with supportive endocrine replacement therapy until normal function returns. The patient should be advised not to administer Improvac and/or any other veterinary medicinal products with similar action in the future.
Even if small amounts have been injected, accidental injection with this product can cause intense swelling, which may, for example, result in ischaemic necrosis and even the loss of a digit. Expert, PROMPT, surgical attention is required and may necessitate early incision and irrigation of the injected area, especially where there is involvement of finger pulp or tendon.

Special precautions for the protection of the environment

Not applicable.

iii) Other precautions:

The safety and efficacy of the veterinary medicinal product in non-target species such as horses has not been evaluated. Adverse events have been observed in horses including serious anaphylactic type reactions which have led to fatalities.

4.6 Adverse reactions (frequency and seriousness)

Male pigs (from 8 weeks of age). Female pigs (from10 weeks of age).

Very common (>1 animal / 10 animals treated):	injection site swelling 2-8 cm in diameter[a] elevated temperature (around 0.5 °C during the 24 hours after vaccination in males and around 1.0 – 1.3 °C during the 24 hours after vaccination in females)
Very rare (<1 animal / 10,000 animals treated, including isolated reports):	anaphylactoid reaction (dyspnoea, collapse, cyanosis and hypersalivation associated with or without twitching or emesis) within a few minutes after vaccination with a duration of up to 30 minutes[b]

[a]When administered to pigs at the youngest recommended age (8 weeks), injection site swellings of up to 4 x 8 cm are very commonly observed. A gradual resolution of the local reactions occurs, but in 20 – 30% of the animals these may persist for more than 42 days.
When administered to older pigs (14–23 weeks of age) injection site swellings may occur very commonly. Injection site swellings ranging from 2 cm to 5 cm in diameter are commonly observed, and injection site reactions at slaughter are commonly observed if the second vaccination is given only 4 weeks before slaughter.
[b]In a small number of animals, death occurred following the reaction, however most animals recovered without treatment and did not appear to react to subsequent vaccinations.

Reporting adverse events is important. It allows continuous safety monitoring of a veterinary medicinal product. Reports should be sent, preferably via a veterinarian, to either the marketing authorisation holder <or its local representative or the national competent authority via the national reporting system>. See also the last section of the package leaflet for respective contact details.

4.7 Use during pregnancy, lactation or lay

Pregnancy:
Do not use during the whole pregnancy.

Lactation:
Do not use during lactation.

Fertility:
Do not use in breeding animals.

4.8 Interaction with other medicinal products and other forms of interaction

No information is available on the safety and efficacy of this immunological veterinary medicinal product when used with any other veterinary medicinal product. A decision

to use this immunological veterinary medicinal product before or after any other veterinary medicinal product therefore needs to be made on a case by case basis.

4.9 Amounts to be administered and administration route

Subcutaneous use.

Entire male pigs from 8 weeks of age onwards should be vaccinated with 2 doses of 2 ml at least 4 weeks apart, with the second dose normally given 4 to 6 weeks prior to slaughter. If slaughter is intended to be later than 10 weeks after the second dose a third dose should be given 4 to 6 weeks before the planned slaughter date. In case of suspected misdosing, the animal should be revaccinated immediately.

Female pigs from 10 weeks of age onwards should be vaccinated with 2 doses of 2 ml administered 4 to 8 weeks apart. In case of suspected misdosing, the animal should be revaccinated immediately.

Administer by subcutaneous injection in the neck, immediately behind the ear, using a safety vaccinator. As a guide, use a short needle (16G, typically) to give 12 to 15 mm penetration. To avoid intramuscular deposition and lesions, it is recommended to use a shorter needle to give 5 mm to 9 mm penetration in undersized pigs and pigs younger than 16 weeks of age. Note that when using a safety vaccinator part of the needle will be covered by the needle guard and will not penetrate the pig. Depending on the type of safety vaccinator, pressure may also be put on the skin and push the needle a few millimetres deeper into the tissue. These circumstances should be taken into account when choosing an appropriate needle length. Follow instructions for proper subcutaneous injection provided with the device used. Avoid introduction of contamination. Avoid injecting pigs that are wet and dirty. Allow the vaccine to reach room temperature (15-25 ˚C) before administration.

4.10 Overdose (symptoms, emergency procedures, antidotes), if necessary

Administration of a double dose of Improvac (4 ml) to 8 week old piglets very commonly resulted in palpable injection site reactions. The largest reactions were seen around 7 days post administration when the maximum size was 13 x 7 cm. By two weeks post administration the maximum size had decreased to 8 x 4 cm, showing a gradual resolution of the local reactions. A transient increase in body temperature of 0.2 to 1.7°C was observed during the 24 hours after administration, returning to normal after two days. The general health of the animals was not affected.

4.11 Withdrawal period(s)

Zero days.

5. IMMUNOLOGICAL PROPERTIES

Pharmacotherapeutic group: Gonadotropin releasing factor analogue, conjugated.

ATCvet code: QG03XA91.

Immunisation of male pigs with Improvac induces an immune response against endogenous gonadotrophin releasing factor (GnRF), a factor that controls testicular function via the gonadotropic hormones LH and FSH. The active ingredient in this immunological is a synthetically produced analogue of GnRF, which is conjugated with an immunogenic carrier protein. The conjugate is adjuvanted to increase the level and duration of effect.
The effects of immunisation derive from the reduction in testicular function resulting from reduced GnRF activity. This leads to reduced production and concentration of testosterone and other testicular steroids, including androstenone, one of the main substances responsible for boar taint. A reduction of typical male behaviour such as mounting and aggressiveness when mixed with non-penmates can be expected after the second vaccination.

Boars given an initial dose of Improvac are immunologically primed but retain their full testicular function until they receive the second dose, which induces a strong immune response to GnRF and causes temporary immunological suppression of testicular function. This directly controls the production of androstenone and, by removing the inhibitory effect of testicular steroids on hepatic metabolism, indirectly reduces levels of skatole.
This effect is apparent within one week of treatment, but it may take up to 3 weeks for any existing concentrations of boar taint compounds to be reduced to insignificant levels.

Immunisation of female pigs with Improvac induces an immune response against endogenous gonadotrophin releasing factor (GnRF), a factor that controls ovarian function via the gonadotropic hormones, LH and FSH. The active ingredient in this immunological is a synthetically produced analogue of GnRF, which is conjugated with an immunogenic carrier protein. The conjugate is adjuvanted to increase the level and duration of effect.
The effects of immunisation derive from the reduction in ovarian function resulting from reduced GnRF activity. This leads to reduced production and concentration of oestradiol and progesterone. Prevention of typical female behaviour (standing oestrus) and prevention of potential pregnancy can be expected from 1 to 2 weeks post second vaccination; prevention of pregnancy is particularly relevant in situations where fattening entire males and females are commingled.

6. PHARMACEUTICAL PARTICULARS

6.1 List of excipients

DEAE-Dextran
Chlorocresol
Urea
Water for injections

6.2 Major incompatibilities

Do not mix with any other veterinary medicinal product.

6.3 Shelf life

Shelf life of the veterinary medicinal product as packaged for sale: 3 years.
Shelf life after first opening the immediate packaging: 28 days at 2–8 °C. After first broaching with a sterile needle, the container should be returned to the refrigerator. The container can be broached once more only during the next 28 days, then discarded immediately after use.

6.4 Special precautions for storage

Store and transport refrigerated (2 °C – 8 °C).
Do not freeze.
Protect from light.

6.5 Nature and composition of immediate packaging

Immediate packaging:
Polyethylene (HDPE) bottle of, 100 ml (50 doses) or 250 ml (125 doses) sealed with a rubber closure and secured with an aluminium cap.

Outer packaging:
Cardboard box with 1 bottle of 100 ml.
Cardboard box with 10 bottles of 100 ml.

Cardboard box with 1 bottle of 250 ml.
Cardboard box with 4 bottles of 250 ml.

Not all pack sizes may be marketed.

6.6 Special precautions for the disposal of unused veterinary medicinal product or waste materials derived from the use of such products

Medicines should not be disposed of via wastewater or household waste.
Use take-back schemes for the disposal of any unused veterinary medicinal product or waste materials derived thereof in accordance with local requirements and with any national collection systems applicable to the veterinary medicinal product concerned.

7. MARKETING AUTHORISATION HOLDER

Zoetis UK Limited
1st Floor, Birchwood Building
Springfield Drive
Leatherhead
Surrey
KT22 7LP

8. MARKETING AUTHORISATION NUMBER

Vm 42058/5028

9. DATE OF FIRST AUTHORISATION

11 May 2009

10. DATE OF REVISION OF THE TEXT

February 2025

Gavin Hall
Approved: 12 February 2025