Legislation and Practices in Israel for the Protection of Pigs from Unnecessary Pain: Mutilations in Piglets

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ABSTRACT

Since 2012, pig farming in Israel started to be regulated relative to minimal standards for pig protection. On September 2012, the "Guidelines for Pig Farming", were issued by the Veterinary Services of the Ministry of Agriculture, which were replaced by the "Regulations against cruelty to animals (Protection of Animals) (Pig Farming for Agricultural Purposes)" on May 2015, issued by the same Ministry after approval by a specific Commission of the Israeli Parliament. Among other aspects, current legislation deals with the problematic aspect relative to pig farming: implementation of mutilations (tail docking, castration, teeth clipping). The purpose of several articles of the current Regulation was to minimize or avoid unnecessary pain and sufferance in pigs, caused by practices of mutilations. This article examines practical implications of mutilations and addresses potential solutions for consideration in the local pig industry.

Key words: Israel; Pig Farming; Regulations; Mutilations.

INTRODUCTION

Characteristics of swine farming in Israel

In Israel, pig production is limited to largely 25 farms that produce approximately 170,000-200,000 pigs per year, which are located in three well-defined areas in the Country. Specifically, one farm is located in the Negev District (Kibbutz Lahav), with around 1,000 sows and 19,000-20,000 pigs produced per year, while the other 24 farms are situated in the Northern District (1 farm in Fassuta, 23 farms in Ibblin), with a production of 150,000-180,000 pigs per year. In addition, there is an additional farm of 30 Sinclair (minipig) sows in Lower Galilee District (Yokneam) which produces purpose-bred laboratory pigs, not for human consumption. Out of 23 farms located in the Ibblin area, 16 are in close contact with each other, sharing dividing walls, service road, water distribution, manure collection. Three other farms share personnel, owners, semen for artificial insemination, etc. These details contribute in making Ibblin farms a unique epidemiological unit. The number of sows is around 15,000, Landrace, Large-White, Pietrain, Duroc breeds, and their crossbreeds Genetic material (semen for artificial insemination) is periodically imported from Cyprus, Germany and France.

Pig farming in Israel is regulated, like other livestock farming, and the relevant legislation dealing with protection of pigs farmed for agriculture purposes is indicated in Table 1:

This article deals with mutilations of pigs and alternatives to the practice of mutilations in consideration to the local pig industry.

Mutilations in pigs and alternatives to mutilations

Pigs destined to growing/fattening on commercial pig farms in the United States, some European countries and Israel, may undergo several invasive procedures along their short life (6 to 8 months), namely: male castration, teeth clipping

Table 1: Israeli legislation dealing with pig protection

Law against cruelty in animals (Protection of Animal Raised for Agricultural Purposes), 1994	חוק צער בעלי חיים (גידול בעלי חיים לצרכים חקלאיים), 1994
Regulations against cruelty in animals (Protection of Animals) (Pigs Farming for Agricultural Purposes), 2015	תקנות צער בעלי חיים (הגנה על בעלי חיים) (גידול חזירים והחזקתם לצרכים חקלאיים), 2015
Livestock Diseases Ordinance, 1985	פקודת מחלות בעלי חיים, 1985
Regulations against cruelty in animals (Protection of Animals) (Transportation of livestock), 2006	תקנות צער בעלי חיים (הגנה על בעלי חיים) (הובלת בהמות), 2006

or grinding and tail docking (1, 2). These procedures are normally referred to as "mutilations", and are often carried out without anesthesia and/or analgesia in most of the countries in which pig farming exists. A vast literature exists, relative to mutilations procedures connected with industrial pig farming, their physiological or behavioral implications, the differences in their application, and the different legislation approach in different countries (2). It would be over proportional to discuss here in depth the different practical approaches and implications of performing mutilations in pigs, however it is worth considering the last European Food Safety Agency (EFSA) report relative to "Welfare of pigs in farms", 2022, for a detailed analysis with scientific worldwide references (2).

Table 2 summarizes most practiced mutilations in pigs, the traditional justification for each of them, the reference to them in the Israeli latest "Regulations against cruelty in animals (Protection of Animals) (Pigs Farming for Agricultural Purposes)", 2015 (hereafter "Regulations"), and summarized considerations reported in the EFSA report mentioned above.

Severe traumas corresponding to surgeries (castration, tail docking) induce pain. Pain begins acutely, and then the prolonged inflammation induced by the mutilation itself leads to chronic pain. Chronic pain is persistent, associated with the inflammatory process, and to changes with overstimulation of sensitive nerve derivations at the injury level. Undoubtedly, male castration, tail docking and teeth clipping are painful.

When these mutilations are performed for the reasons detailed in Table 2, they may have different implementation times:

- Teeth clipping/grinding: piglets are born with sharp needle teeth, which include the (deciduous) third incisors and the canines. Clipping/grinding is considered useful only when executed *on the first day* or, at the latest, *before the first 72 hours* when the establishment of hierarchy and "teat" order within siblings in the litter occurs. Later than this time, teeth clipping is ineffective and increases the risk of gums wounds and infections. Only the tip of the tooth (enamel) should be clipped or grinded, avoiding the vascularized and innervated pulp chamber (dentine), in order to prevent long-lasting pain and pulp infections. Sows' teat damage and facial damage due to fighting between siblings, are often used as evidences to justify teeth clipping/grinding. On the other hand, different studies have arrived at no conclusive results relative to reduction in mortality and/or increased weight gain for piglets as potential benefits for teeth clipping (2).
- Tail docking is often associated with teeth clipping.
- Male castration is generally executed within *the first week of age*. The earliest day for male castration strongly depends by piglet health, piglet body development, and the ability of the operator; therefore, it may occur *within* the 7th day of age but *after* the 3rd day/72 hours.
- If male castration and tail docking occur after the 3rd day of age, and these mutilations are accompanied by teeth clipping, then the latter occurs after the typical period of establishment of hierarchy for the "teat order" (within 24 hours), therefore resulting an unnecessary potentially painful mutilation procedure.
- The different scheduling for all these mutilations represents a burden to the farmers: Some farmers prefer concentrating and carrying out all the interventions on a piglet on the same day, e.g. teeth, tail and castration, giving the priority to the day chosen for castration.

Table 2: mutilations in pigs; traditional justifications, Israel legislation reference, EFSA summarized considerations.

Mutilation	Reasons/Justifications	Israel legislation*	EFSA considerations
Male castration	Prevent boar-taint off-odor in entire male meat	Allowed under Article 16	– implement dedicated strategies to keep males entire; – adopt immuno-castration; – adopt anesthesia + analgesia
Tail docking	Prevent infections induced from tail biting, and consequent losses	Allowed under Article 15	– should not be performed; – tail biting should be prevented; – it is not necessary if husbandry practices, and management are appropriate;
Teeth clipping	Prevent teats and udder lesions during suckling; Reduce lesions during piglets' fights	Allowed under Article 15	– inherently injurious; – stressful procedure; – when performed incorrectly, it causes short and long-term pain; – association with teat/udder lesions is not clear; – if strictly necessary, prefer grinding or filing
Ear notching	Identification	Forbidden under Article 14	– – –
Branding (hot; freeze)	Identification	Forbidden under Article 14	– – –

* "Regulation against Cruelty in Animals (Protection of Animals) (Pigs Farming for Agricultural Purposes)", 2015

– In other situations, male piglets are handled twice: at teeth clipping together with tail docking; then at castration; handling piglet twice also represents a source of stress (1,2).

Pain control when executing mutilations

The main solutions for pain reduction and management, in case of the described mutilations which are actually in use, are hereby summarized: Under Articles 15 and 16 of the Regulations, male castration, tail docking and teeth clipping/grinding should be carried out by a skilled and authorized person in piglets until the 7th day of age, and accompanied by analgesic treatment. The "Procedures for the implementation of the Regulations, 2015", indicate Meloxicam 0.4 mg/kg as the first choice analgesic and Flunixin 1-4 mg/kg as second choice (3). Meloxicam can be increased at a dose of up to 1 mg/kg. Ketoprofen, 6 mg/kg should be also considered. It has however been hypothesized that analgesic treatments may not adequately alleviate acute pain during the surgery itself, and that the analgesic effect may last only 24 to 48 h at the best (2). Therefore, a combination of a local injectable anesthetic, like Lidocaine 2-4 mg/kg, or Mepivcaine 2%, 0.6 ml/head, together with systemic analgesia as indicated above, represents a solution for the efficient reduction of acute surgical pain and post-operative pain relief. Under Articles 15 and 16 of the Regulations, the combination of anesthesia and analgesia is compulsory only if a mutilation is performed after the 7th day of age and in such a case, only a Veterinarian may perform it. Options relative to full anesthesia of piglets appear impractical in local field situation.

Most interestingly, EFSA report 2022, underlines that in countries in which pain control is mandatory (anesthesia and/or analgesia) and farmers are allowed to administer the treatments by themselves, these farmers consider the use of these drugs as feasible and effective. This is apparently in contrast to countries where the use of such drugs is not mandatory, so that farmers see in their use a further burden in the daily operations. Thus, apparently, once farmers get adapted to this practice, they no longer consider it a burden.

According to Israeli legislation, anesthetics can be only used by Veterinarians. According to Article 26 of Regulations, mutilations are still considered as surgical interventions, which may be performed by skilled and authorized persons. This authorization represents a derogation of Article 4 of Veterinarians Law, 1991, which entitles only Veterinarians to perform this kind of interventions. If we consider examples from other Animal Welfare legislations (4) a similar derogation could be considered for the use of some specific local anesthetics, at farm level, under prescription, training, supervision and responsibility of farm veterinarians (4).

Alternatives to mutilations:

Alternative strategies to male castration, tail docking, teeth clipping/grinding exist. Scientific literature is abundant, and is extensively summarized in the EFSA report, 2022 (2). An in-depth description of such alternative procedures is beyond the purposes of this communication; rather, it is worth repeating some articles relating to regulations, which can definitely have a significant role in preventing mutilations and unnecessary pain in pigs.

Male castration:

In western countries, the public call for animal-friendly alternatives to surgical castration, such as immuno-castration, or raising of entire males. Israel Regulations, Article 16, only requires analgesia, with appropriate drugs, during the course of male castration, with different requirements according to age (less or more than 7 days of age) however, there are no other considerations. While it appears acceptable that meat from entire males may be repulsive for human consumption, due to "boar taint" (the unpleasant odor in fat and meat resulting from androstenone, skatole and indole compounds), this negative effect can be prevented by alternatives to castration:

- Slaughtering intact male pigs before they reach sexual maturity (7th month of age at the latest).
- Immuno-castration as an alternative to surgical procedure.

Slaughter of intact male pigs

Carcass weight represents the commercial variable in pig production, while age, genetic and fat/lean meat development, represent the management variables, which must be taken into account when keeping males intact (i.e. not castrated). In fact, the Duroc race of pigs has the highest levels of androstenone, whereas the maternal lines of Landrace and Yorkshire have lower levels. The paternal line of the Pietrain breed has the lowest level, and it is characterized as the most "lean" (less back fat) pork meat at slaughter (2, 5, 6). Apart from Yorkshire, the Landrace, Landrace x Large-white and Pietrain breeds are the most commonly used in Israel, where live slaughter weight is around 100 kg body weight (bw) or less. Correct pig farming management, and adequate feeding formulations, can allow the slaughter target body weight to be reached before the sexual maturity of male pigs. An extensive research in The Netherlands, over a period of 5 years, involving more 1.5 million intact male pigs from over 1,500 farms and over 18,000 shipments to slaughterhouses, revealed a positive correlations between boar taint and carcass weight, age, and back fat thickness (5). Intermediate boar taint was detected in 3.3% (1.5%–5.8%) of intact male pigs, at an average slaughter weight of 91.9 Kg (80–105 kg), at ages of 165 to 188 days, and back fat 9 to 18 mm. The highest boar taint values were correlated with age (4.7% at 188 days); back fat (4.4% at 18 mm), and carcass weight (>3% at weight >95kg). This extensive research in intensive pig farms, at a relatively low slaughter weight, with low and acceptable results in terms of unpleasant boar taint, may serve as an example for commercially sustainable alternatives to surgical male castration. Preference for "lean" genetics, progressive demission of races/genetics characterized by high levels of androstenone (e.g. Duroc), qualitatively improved feed ratio which allowed to bring to slaughter weight at about~100 kg, before the age at risk for sexual maturity and boar-taint development (≤180-190 days) all these measures would reduce the risk of boar taint to negligible and would allow abandoning male surgical castration practices.

Immuno-castration

Immuno-castration consists of active vaccination/immunization against the Gonadotropin Releasing Hormone (GnRH) or Factor (GnRF), the hormone/factor of the endocrine cascade regulating reproductive functions. GnRH release starts at the hypothalamus level, and is then transported to the anterior pituitary gland where it stimulates the release of the two gonadotropins: Luteinizing Hormone (LH) and Follicles Stimulating Hormone (FSH). In males, LH stimulates in turn Leydig cells at testicular level, with production of steroidal hormones (6).

The active ingredient of a castration vaccine is a synthetically produced GnRH-analogue, conjugated with a carrier protein and adjuvanted to increase the level and duration of the immunogenic effect (7). Vaccination/immunization against GnRH induces anti-GnRH antibodies, which bind and neutralize GnRH and therefore inhibit LH and FSH release, affecting in turn steroidal hormones production, including androstenone. Indole and skatole, which are produced at large intestine level, will also be affected, their production reduced, with higher and more efficient metabolism by the liver and negligible accumulation in tissues and fat. One or two injections are necessary in lightweight (~100 kg body

Table 3: Examples of environmental enrichment materials and their characteristics (modified from 2, 8, 9).

Characteristic	Materials	Integrations/combinations
Optimal	rice husk; straw pellets; straw; silages	Can be used alone
Suboptimal	hay or straw *on a rack*; ropes (natural material); soft wood logs; saw-dust; saw-chips; peat; sand and pebbles; ground; shredded paper; pressed-shredded paper logs; pressed-straw logs; pressed-sawdust bricks (suspended)	Should be combined between two of them, with different characteristics
Marginal	metal chains and pipes; hard wood logs; hard plastic balls; hard/soft plastic pipes; salts bocks	Should be changed or: Must be combined with other Optimal or Suboptimal.

weight) pig production as in Israel. The first administration should take place at 8 weeks of age and the second 4 to 6 weeks before slaughter (i.e., around 5 months of age), at the onset of puberty/sexual maturation. This will result in a 10-week postponement of maturity, which will allow in turn reaching the slaughter weight/age without developing boar taint.

Further ancillary advantages of immune-castration are a reduced mounting behavior, resulting in a reduced risk of skin lesions, penis injuries, and legs/locomotor disorders. Despite not being practiced in commercial farms, since the immuno-castration is based on LH, FSH inhibition, it could be theoretically used on females as well.

Tail docking:

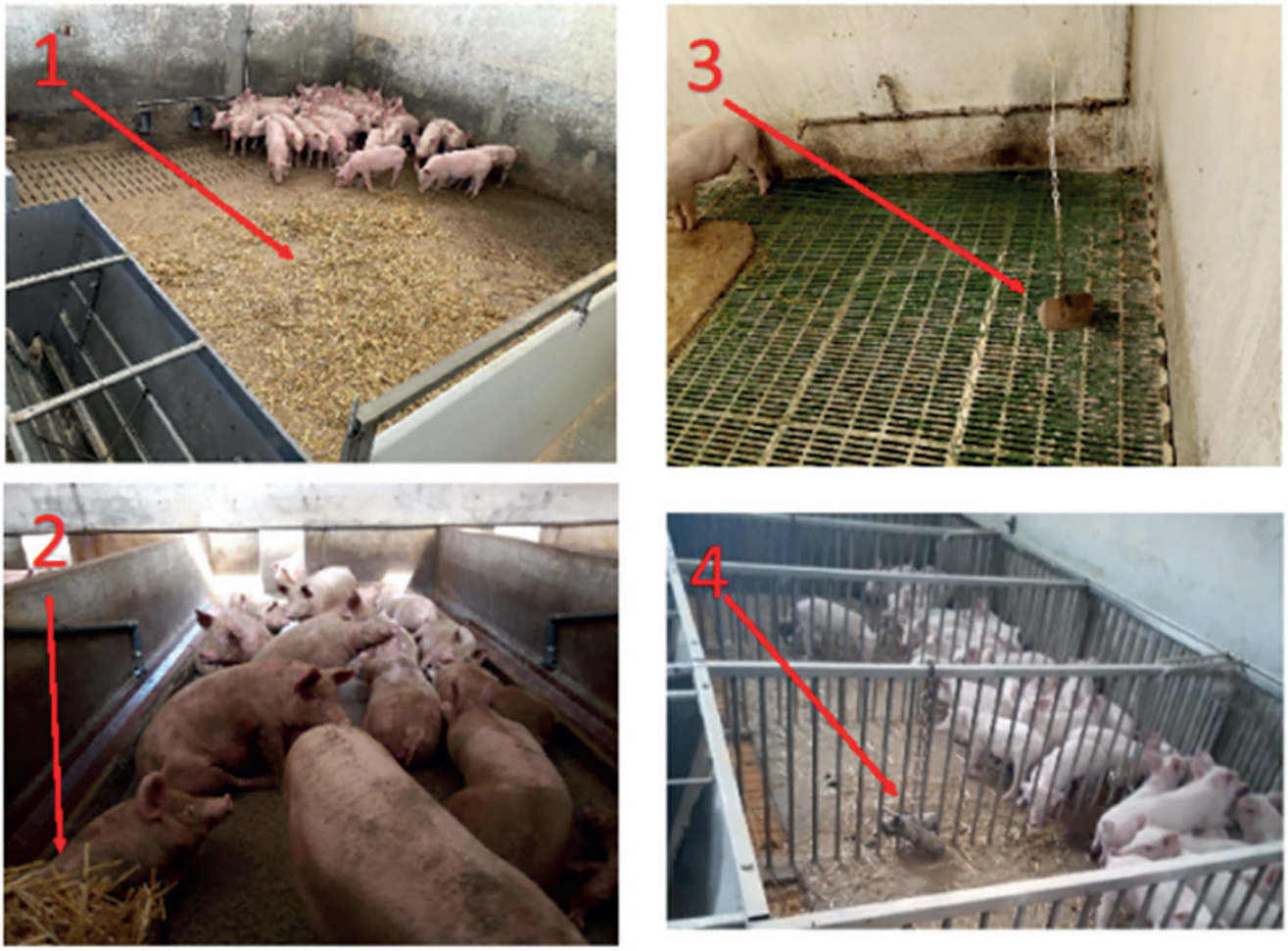
In the Regulations, Article 4 establishes the minimal space allowance for pigs according to weight. Article 6 establishes the adequacy of slatted concrete floors with respect to weight and age of pigs (in relation to hoof development). Article 8 establishes the requirements for air and ventilation quality. Article 10 establishes the correct requirements for feed supply (quantity, quality, ways of distribution) and water (drinkable quality, minimal number of drinkers per group of pigs). Article 17 establishes the environmental enrichment (straw, saw-dust, peat, wood-logs, "toys", etc.) that should be provided to pigs. Indeed, all these factors were examined in EFSA report, 2022 and conclusions were that "*tail biting risk is increased with reduced space allowance, increasing proportion of slatted flooring, high air speed and poor air quality, lack of enrichment, poor health status and deficiencies in feed composition*" (2). In commercial pig farms that are properly designed and maintained, the environmental enrichment represents the main tool to control tail biting in both docked and undocked pigs (2). Environmental enrichment with manipulative, exploratory material helps also in "belly nosing" reduction, i.e., sucking, chewing the body of pen mates, especially foreskin, between piglets. Tail, ear and flank lesions caused between pigs are more prevalent when the environment provides few, poor or no diversions for exploratory behavior (2). Space allowance (or animal crowding), floors adequacy, air quality and ventilation flow, correct feed and water supply, can all be considered as "environmental-based measures" and can be objectively measured.

The evaluation of the quality of enrichment material requires a balance between a "factual assessment" of the enrichment material (e.g. presence or absence; quantity; cleanness; safety, etc.) and "actual interest" by the animals, which is indicative of its adequacy for the purpose of satisfying explorative behavior and, therefore, reducing or preventing tail biting. Relative to these last characteristics, enrichment material may be classified as *optimal*, *suboptimal* or *marginal* and therefore if it can be used alone (optimal), if it should be integrated with something else (suboptimal), or if it must be heavily integrated or changed (marginal) (2, 8, 9). Table 3 above reports some examples of materials and their characteristics.

Picture 1 illustrates some different enrichment materials, and their categorization:

The correlation between "factual assessment" (presence of material) and "actual interest" (pigs interacting with the material) will answer the question as to whether the enrichment material is adequate to satisfy the explorative needs of pigs and reduce their boredom, contributing therefore to tail-biting control. These concepts should be kept in mind when verifying if the enrichment material matches with Article 17 of Regulations, or when, as Veterinarians, we are asked to solve tail-biting problems in a herd.

The "actual interest" should be measured according to a



Picture 1: Different enrichment materials: 1-optimal (straw on floor, mixed with gross-feed); 2-suboptimal (straw on rack); 3-suboptimal (wood-log); 4-marginal (metal chain and pipes).

quantitative evaluation of pig activity (8, 9). The following protocol is recommended:

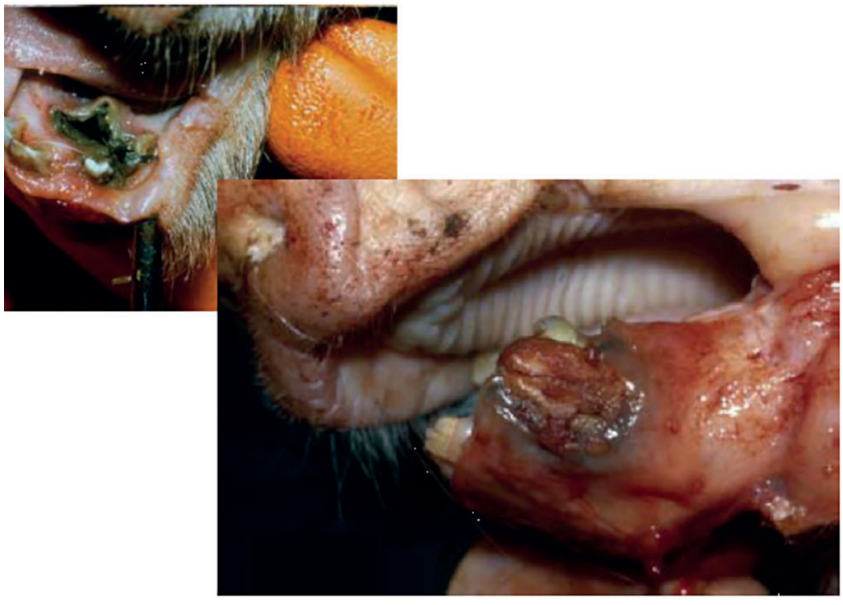
- Approach the pens at least one hour after a meal (if animals are fed at fixed intervals); wait for at least 2 minutes (habituation time);
- Count the animals according to their behavior:
  - o Animals **P**laying with enrichment material = **P**
  - o **T**otal awake animals (not sleeping; but also NOT eating and NOT drinking) = **T**
- Calculate the percentage of animals ***Interested*** in the enrichment material provided as follows:
  I ("**I**nterest index") = **P**/(**P**+**T**)*100. This procedure needs to be repeated ideally for all the pens, but at least for a total of 100 animals. Additionally, the "Interest index" must be estimated separately according to the different categories of animals (weaners; growers; fatteners; breeders). Obtained results can be interpreted according to Table 4 below.

The results should be then compared with the state of tail biting. Consider striking incongruences (e.g. minimal interest even if in the presence of optimal material) by examining the quality of the material, for example in terms of cleanness/dirt, dryness/humidity, etc., then suggest the necessary cor-

Table 4: Interest Index in the environmental enrichment (modified from 8, 9).

Interest Index	Explorative behavior/interest
0 – 18%	Minimal
>18 – 86.3%	Intermediate
>86.3 – 100%	Maximal

Picture 2: Paper layers from feed sacks highly attract weaned piglets. Piglets have their tail docked. Hardwood log is marginal and useless



Picture 3: Necrotic pulpit (left) and gingivitis (right), after badly executed teeth clipping.

rections to the farmer. If under this assessment, the pigs are scored as exhibiting "minimal exploratory behavior", consider making changes in the farm and introduce enough optimal or suboptimal materials (8, 9).

When intervening in a tail-biting outbreak or excessive fighting (as typical at weaning), provide immediately distractions to pigs: e.g., paper layers (from the typical 25 kg. feed sacks). These are excellent distraction tools, having an immediate effect, but they are destroyed in a very short period and must be replaced with longer lasting materials as soon as possible. This solution could be routinely used at once when weaning and mingling litters, to distract piglets from hierarchy fights. In general, biters should be removed from the group; injured pigs should also be removed and isolated according to Article 19 of the Regulations. Clipping of incisor teeth of biters, as used in the past, is not acceptable any longer. Picture 2 illustrates use of paper layers from feed-sacks as distracting material.

Consider modifying the diet of a problematic groups by increasing fiber quantity to about 4%. This will increase the daily-ingested feed and lead to a higher sense of satiety. In breeders, fiber quantity in the diet should not be below 10% (Article 10 of Regulations) or even better, be available in the form of regularly supplied straw (50 to 200 g/day/breeder).

Teeth clipping:

Teeth clipping should not be used: only the sharp tip of the teeth (enamel) should be grinded or filed without the sensitive tissue (pulp; dentine) being injured. Only well trained staff should carry out this procedure. When visiting or inspecting a litter, piglets' lips and mouths should be checked. Any injures at gum level are indicative of excessive deep grinding or, most probably, of a too deep clipping procedure instead of superficial grinding. In such a case, training of staff should be questioned. Picture 3 illustrates gum lesions and necrotic tooth pulpit following badly executed teeth clipping (10). Highly prolific genetics (i.e. more piglets per sow than her number of functional nipples), without proper management of prolific litters (e.g. alternate suckling, fostering strategies, early supply of milk replacers, etc.) should be discussed with farmers and addressed to control and reduce siblings fighting for teat order.

CONCLUSIONS

Regulations, for Article 18, require the registration of mutilations including the analgesic treatments applied to the pigs. The documentation should remain available for official investigations for at least two years (3). During this period, the Veterinary Services may investigate on a routine basis the implementation of the analgesic treatments.

Characteristics of pig farming in Israel definitely allow a reconsideration of the potential severity of mutilations in piglets. Regarding castration, correct management and feeding, immuno-castration, and genetic/breeding techniques can be implemented to avoid surgical castration. Local anesthesia combined with prolonged analgesia should be used if surgical castration is categorically preferred by the farmer. Where teeth clipping/grinding can be justified, training for correct implementation of the procedures is the most important measure to prevent and mitigate welfare consequences. This operation should anyway be justified based on individual litter situations and not performed routinely. Tail docking can be avoided by supplying piglets and weaners/growers with enrichment material, in addition to improving general environmental and space allowance conditions.

All these strategies may allow for an update of Regulations, relative to Article 15 (tail docking; teeth clipping), and 16 (castration), and possibly for the complete abolition of these mutilations. At the utmost, mutilations as per Article 15, should be allowed only under the implementation of specific improved management programs, under compulsory Veterinary supervision, and within a limited time-frame with the ultimate goal of their elimination.

ANIMAL WELFARE STATEMENT:

Lesions in Picture 3 were not produced for research purposes but were presented as clinical cases.

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