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Use of Injectable Tansponders in Pigs

Within the framework of an EU-project (EID+DNA tracing) the use of injectable transponders in pigs was tested on three application spots, depending on the size of the transponder and piglet's age. One week or three week old piglets were injected intraperitoneally, in the earbase and in the outer ear. Although the intraperitoneal injection is most difficult, it showed lower transponder losses, higher reading efficiency with 23 mm transponders and good recovery results so far.

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Regarding the growing demand for documentation in integrated pig production systems, it is obvious that a secure and unique identification of livestock animals is required. The official tagging system for pigs is based on a plastic ear tag with a printed farm number, which has to be recorded visually. With this kind of ear tag an automatic data recording and a unique identification is not possible. In the meantime transponders, such as electronic ear tags and injectables are available for individual tagging of pigs. The main problem for the use of injectable transponders is the definition of a suitable injection site, which offers an easy application, minimal loss rate and an easy recovery in the slaughterhouse.

Application of transponder

Within the European Research Project EID + DNA-Tracing (Electronic Identification and Molecular Markers for Improving the Traceability of Livestock and Meat - QLK1-CT-2001-02229) different injection spots were tested, regarding the size of the transponder and the age of application. The following injectable transponders were used:
- 12 • 2.1 mm (FDX-B); Planet ID GmbH
- 23 • 3.0 mm (FDX-B); Datamars S.A.
- 23 • 3.8 mm (HDX); Allflex Europe S.A.

All products were in compliance with the international standards for animal identification ISO 11784 and ISO 11785, sterile packed and compatible to one injection tool (Injection device designed by Hüther). The earbase, the outer ear and the abdominal cavity were investigated as injection spots in piglets (*Fig. 1*) which were tagged in the 1st and 3rd week of life. The injection in the earbase was done in a vertical way subcutaneously at the backside of the ear-cartilage close to the earbase. To inject the transponder the ear was elongated slightly in order to place it in the correct way. For the second application spot the transponder was injected in a horizontal way in the inner side of the ear between the skin and the "cartilage-fingerlines". For the intraperitoneal injection the piglet was in a hanging position, head down, whereas the transponder was placed between median and teat line caudally to the navel at the level of the fourth and fifth pair of teats.

For an evaluation of transponder sizes and application spots different aspects were investigated. Besides the easiness of injection, the reading efficiency and the secure recovery were taken into account. To calculate the reading efficiency the transponders were read with handheld readers and stationary readers which were integrated in a weighing scale for pigs.

Depending on the application spots, the transponders had to be removed from the carcass at different stations in the slaughterline. The recovery of the transponders from the earbase and the outer ear was realized at the station where the eyes and the auricle were cut off from the carcass. Transponders, placed in the abdominal cavity, were separated at the station were the evisceration took place. The experiment was carried out in collaboration with the Institute of Animal Husbandry and Animal Welfare, the experimental farms "Karolinenfeld" and "Baumannshof", as well as the with the experimental slaughterhouse in Grub. Overall, 405 pigs were included in this trial.

Results

The analyses of the mentioned parameters showed that for the application of a transponder in the region of the ear a second per-

Table 1: Amount of transponder losses depending on injection spot and transponder size

Injection spot	Transponder size	animals tagged	Transponder-losses	
	in mm	[n]	[n]	[%]
Eabase	12 • 2,1	52	1	1,9
	23 • 3,0	97	4	4,1
	23 • 3,8	69	4	5,8
Outer ear	12 • 2,1	24	12	50,0
	23 • 3,0	18	9	50,0
Intraperitoneal	12 • 2,1	30	0	0
	23 • 3,0	66	0	0
	23 • 3,8	49	1	2,0
Total		**405**	**31**	**7,7**

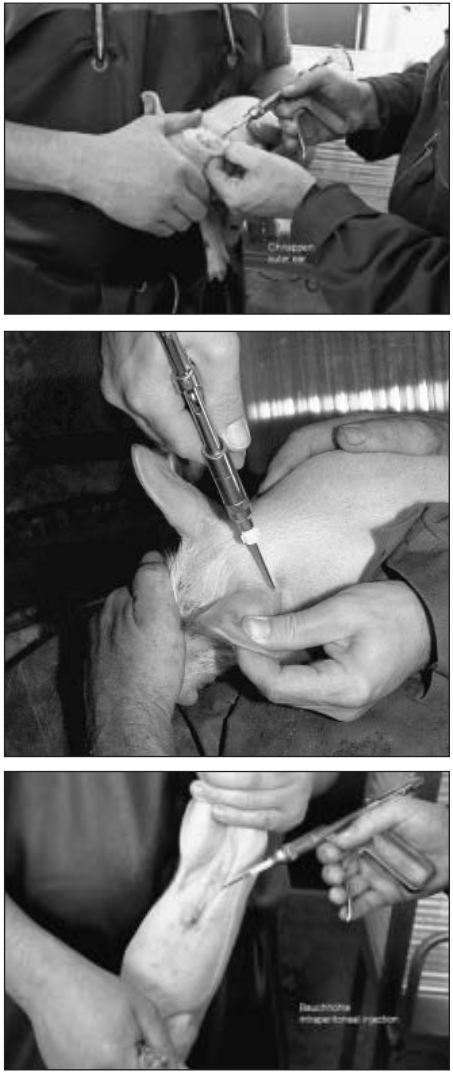

Fig. 1: Application spots at pigs

son, who keeps the animal in a fixed position, is very helpful. For an appropriate intraperitoneal injection an assistant was required in this investigation to handle the piglets. The second person was necessary independently of the age of application. The tagging of very young piglets with a big sized transponder can not be realised in the area of the ear, because there is not enough space. Due to that reason no piglets were tagged with 23 • 3.0 mm transponders in the outer ear in the first week of life. The same limitation was observed for transponders of 23 • 3.8 mm size at age of first, respectively third week of life. Regarding the intraperitoneal injection these limits have not been observed, so that also bigger transponders can be injected at an early stage of life. It should be mentioned that one piglet out of 145 died due to the injection of a big transponder in the abdominal cavity.

The control of the transponders showed different rates of losses in dependence on injection spot and transponder size. 50 % of transponders, injected in the outer ear, were missing (*Table 1*). The loss rate in the earbase increased with transponder size. The smallest transponder (12 • 2.1 mm) showed losses of 1.9 %, the middle sized transponder (23 • 3.0 mm) 4.1 % and 5.8 % of the bigger ones (23 • 3.8 mm) could not be found anymore. In opposite to that, only 2 % of the injected transponders in the abdominal cavity were missing.

Both experimental farms used the electronic identification in combination with a weighing scale for automated and individual data recording. As expected, the reading range and the successful identifications increased with the transponder size (*Table 2*). The 12 • 2.1 mm transponder reached an identification rate of 0 to 73 %. With the middle sized transponder (23 • 3.0 mm) an identification rate of 93 to 100 % was achieved. The biggest transponder (23 • 3.8 mm) was read successfully in all cases (100 %).

The involved animals were slaughtered in the experimental slaughterhouse with a chain speed of app. 40 pigs per hour. Due to premature death and sales, 39 animals out of 405 tagged animals could not be included in the results, so that finally 366 animals were included for this analyses. Under these slaughter conditions 100 % of the transponders could be recovered in the abattoir. The recovery from the earbase was done either directly during the slaughtering process (42.1 %) or in a two step procedure (49.6 %). In this case the ear was cut off from the carcass during slaughtering and the transponder was separated afterwards. 7.4 % of the injectable transponders were recovered without any further documentation. In two cases (0.9 %) the transponder was recovered after slaughtering, before the carcass was moved to the cooling chamber. Transponders placed in the outer ear could be found after a second cut in the separated outer ear (88.9 %). The rest of the transponders (11.1 %), exclusively 12 • 2.1 mm, were not found on the expected place, but in the part between ear and neck. Intraperitoneal injected transponders were found at a rate of 88 % between the removed intestines. The transponders were located in the connective tissue, the so called *Omentum majus*. The majority of transponders was encapsulated within a thin layer of connective tissue, which lead to a fixation and a more or less defined position of the transponder in the removed intestines. 8.3 % of the transponders were not fixed in such a way. These transponders dropped from the carcass during evisceration. 1.5 % of the transponders were separated without further documentation. Related to the smallest transponders (12 • 2.1 mm) some particularities need to be mentioned. 1.5 % of the transponders were found in the connective tissue below the muscles. One transponder (0.7 %) was attached to the small intestine (*Intestinum tenue*). It can be concluded, that independently of the used injection spot, a bigger transponders offers advantages in the slaughtering process. Palpation is easier and in general it can be detected visually in a faster way.

Injection spot	Transponder size	Piglets	Weight	Read		Not read	
	in mm	[n]	[kg]	[n]	[%]	[n]	[%]
Eabase	12 • 2,1	18	8,9	13	72,2	5	27,3
	23 • 3,0	58	8,2	54	93,1	4	6,9
	23 • 3,8	10	7,7	10	100,0	0	0,0
Outer ear	12 • 2,1	11	7,8	8	72,7	3	27,3
	23 • 3,0	14	7,6	14	100,0	0	0,0
Intraperi-	12 • 2,1	17	8,5	0	0,0	17	100,0
toneal	23 • 3,0	55	7,8	52	94,5	3	5,5
	23 • 3,8	31	7,8	31	100,0	0	0,0

Table 2: Identification rate of transponders on a weighing scale for piglets with reading equipment (DSE 500 V2, Hotraco Micro ID)

Conclusions

The results of the experiment show, that the injection of a transponder can be done at an early stage of life, but success is strongly related to the transponder size, the injection spot and the application age of the piglet. In case that piglets need to be tagged during the first week of life, the outer ear is the most difficult injection spot, due to anatomical restrictions. These restrictions are less at the ear base and hardly not existent for the intraperitoneal injection. The same ranking of injection spots is given, when the results of transponder losses are regarded. A high loss rate was observed in the outer ear, followed by the ear base. The lowest transponder losses were found after intraperitoneal injection. For secure automatic animal identification the reading range is an important factor. This is mainly related to the transponder size. Referring to this, good results were obtained with the 23 • 3.8 mm transponders. For a further evaluation the "food-chain-risk" has to be taken into account. In this context the abdominal cavity has some advantages, because the transponder is not directly related to consumable meat. Further investigations are carried out in cooperation with practical farms and commercial slaughterhouses to verify the obtained results.