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THE USE OF TRANSPONDERS AS A METHOD FOR INDIVIDUAL IDENTIFICATION OF RABBITS AND RABBIT CARCASSES.

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ABSTRACT

Two trials have been made of electronic identification using radiofrequency; one with live animals and the other with carcasses. A total of 92 live animals were used: 43 animals of 1-week old at the time of injection and 49 animals of 4-weeks old. Two locations for injecting the transponder were studied: the ridge between the shoulder (22 of one week and 25 of four) and the inguinal zone (21 of one week and 24 of four). The transponder was recovered when the animal was sacrificed at 9-weeks old. In the second trial 54 rabbit carcasses were used, with two locations for injection: the thigh (29 carcasses) and the neck (25 carcasses). In both trials, the time required for injection and recovery of the transponder was recorded. The percentage of breakages, losses of new transponders was quicker than that of re-utilized transponders (13s vs. 22s). Less time was needed to inject (14s) and recover (24s) transponders for one-week old animals. It was also observed that the best location for injection of the transponder without reducing the value of the carcass was the neck-zone, though the injection time was greater (19s vs. 5s in the thigh).

INTRODUCTION

The first work on electronic identification via transponders injected into species of zoo technical interest was done on cattle (Caja *et al*., 1994, Conill *et al*., 1997) sheep (Caja *et al*., 1994) and pigs (Lambooij *et al*., 1992 and 1995). With respect to rabbits, only one experiment has been made with 5 laboratory animals (Mrozek *et al*., 1997) In these initial works, both recovery of the transponder (Lambooij *et al*., 1992 and 1993), and the injection site (Caja *et al*., 1994, Conill *et al*., 1997) were studied. Nowadays it is established that the best recovery is of biocompatible glass injected transponders, given that no tumours or infections have occurred in the species tested (Lambooij *et al*., 1992 and 1995). The best injection site is not defined for rabbits and is being investigated for other species

The use of transponders is not limited to identification of live animals. M. Klindtworth (1995) studied their use to identify reliably and permanently animals killed in the slaughterhouse, working with pigs and cattle but not rabbits.

This work studies the possibility of using transponders as a method of individual identification of rabbits and the best location for them, and also the use of transponders to identify commercial rabbit carcasses. For carcasses, both a lasting and reliable location of the transponder and avoiding reduction of the value of the carcass were studied.

MATERIAL AND METHODS

Two trials were made of electronic identification using radiofrequency: one with live animals and the other with carcasses.

TRIAL 1: A total of 92 live animals were used. The transponder was injected into one group of 43 animals in their first week of life and into the other group of 49 animals in the fourth week. In each group, half the transponders were injected in the ridge between the shoulders and the other half in the inguinal zone. The transponders were recovered when the animal was sacrificed (at 9 weeks old). Each transponder was re-used at least twice after recovery. Readings were made at the time of injection, 24 hours after injection, 48 hours after injection and then weekly until the animal was sacrificed at 9 weeks old.

TRIAL 2: A total of 54 carcasses were used. The transponder was injected into the thigh of 29 and into the neck of the other 25, beneath the appendages of connective tissue which remain when the animal is skinned. Once the transponder was injected, the carcasses were frozen at -25°C for 48 hours and then thawed out. Readings were made on the frozen carcass at 24 and 48 hours, and on the thawed carcass. All the animals were 9 weeks old at sacrifice, and all the transponders were re-used.

System of Identification:
The identification system consists of an active transmitter-receiver (unit for readings) and an emitter-receiver (transponder) which emits a code signal on activation at a certain distance by the reading unit. A total of 48 transponders of the make Avid© (14mm x 2.1mm) were used, hermetically sealed with biocompatible glass.

Variables studied:
INJECTION EFFECTIVENESS: Percentage of injections in which the transponder is not retained inside the needle.
BREAKAGES: Percentage of transponders which broke after being introduced into the animal.
PROGRAMMED READINGS: Percentage of animals in which all of the programmed readings were able to be made. Readings for animals which died during the trial were not included.
TUMOURS AND INFECTIONS: Percentage of animals which developed a tumour or infection related to the injection of the transponder.
TRANSPONDERS RECOVERED: Percentage of transponders injected which were recovered.
IT: Injection time. Time taken to inject the transponder in seconds. The time-count starts when the animal is taken in one hand and the needle (of the syringe) containing the transponder is held in the other.
RT: Recovery time. Time taken to recover the transponder from an animal which has been sacrificed and skinned in seconds. The time is counted from when a positive reading of position is made until the transponder is extracted.

Statistical analysis:
Averages were calculated by minimum squares for the variables TI and TR, using the GLM procedure from the SAS statistical package (1996). In trial 1 the model used took as fixed effects the age of the animal (1 or 4 weeks old), the location of the transponder (ridge between shoulders or groin), transponder use (new or re-used) and the interaction between the age of the animal and the location of the transponder. In trial 2 the only fixed effect was location (thigh or neck).

RESULTS AND DISCUSSION

Table 1 shows the global averages for the characteristics studied in percentage terms. It is seen that injection effectiveness is very high with both new and re-used transponders, near 100% in live animals and 96.3% in carcasses (a result of 3 re-used transponders which stayed in the needle and were not injected). All the readings programmed were made successfully in all the animals into which a transponder was injected (11% of the animals died for pathological reasons unrelated to transponder injection).

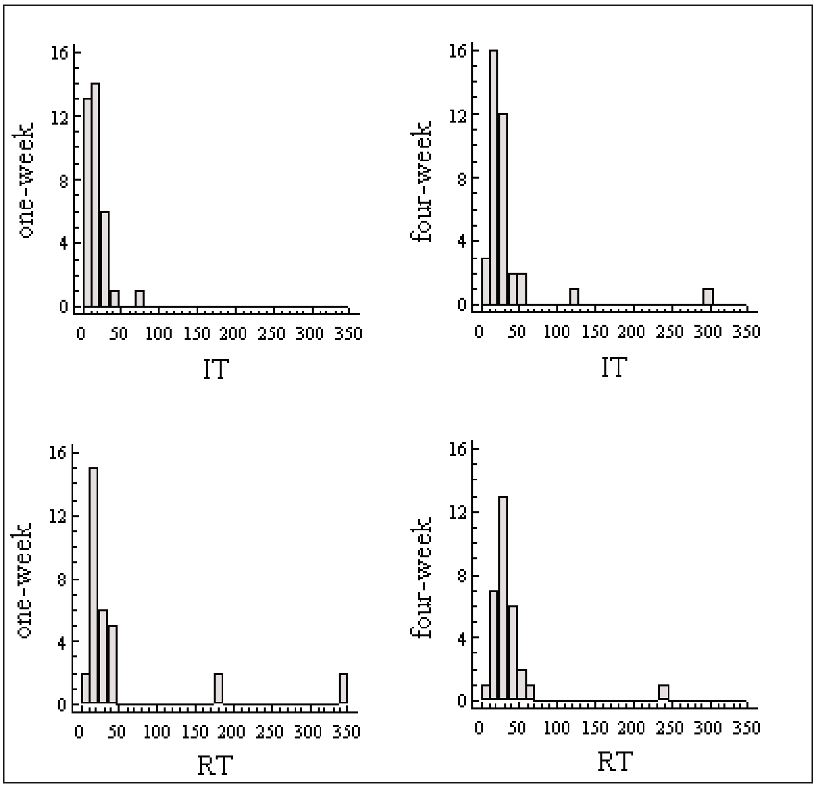
Table 1: Results of injection effectiveness, breakages, readings programmed, tumours and infections, transponders recovered and total numbers.

	Live Animals	Carcass
Injection effectiveness (%)	98.9	96.3
Breakages (%)	0.0	0.0
Readings programmed (%)	87.9	100.0
Tumours and infections (%)	0.0	-
Transponders recovered (%)	96.7	100.0
Total numbers	92	54

The percentage of breakages is similar to that obtained in other studies on sheep (Caja *et al*., 1994) calves (Conill *et al*., 1997) and pigs (Lambooij *et al*., 1995) with transponders injected in biocompatible glass (approx 1%). Losses seem to be clearly related to the site of injection; so in calves Conill *et al*., (1997), had losses of 5.2%, 14% and 1.7% of transponders injected into the ear, lip and axilla respectively, while Lambooij *et al*., (1992 and 1995) in pigs, had losses of 0% and 1% of transponders injected into the base of the ear. The fact that neither tumours nor infections were detected is closely related to encasing the transponder in biocompatible glass, as already described for pigs (Lambooij *et al*., 1992 and 1995). Recovery of transponders was very high, practically 100%. Re-use of transponders did not lead to any increase in the percentage of breakages, losses, tumours or infections.

Figure 1 shows the frequency histograms for variables IT and RT for one-week old and four-week old live animals. Values very far removed from the trend were recorded on some animals. These values were considered to be outliers, and were not included in the analysis for calculation of averages by minimum squares. Three exceptionally high values were observed for injection time (IT), one on a one-week old animal and two on four-week olds, all of which were difficult to handle. The mean transponder injection time for one-week old animals, excluding the outliers, was less than for four-week old animals (14.47 ± 1.56s versus 22.12 ± 1.57s), although this difference does not have practical relevance. At the same time the mean injection time using new transponders, excluding outliers, was lower (13.50 ± 1.87s versus 23.09 ± 1.32s with re-used transponders), and this difference also has little relevance in practice. The location of the transponder and the interaction between age and location were not significant.

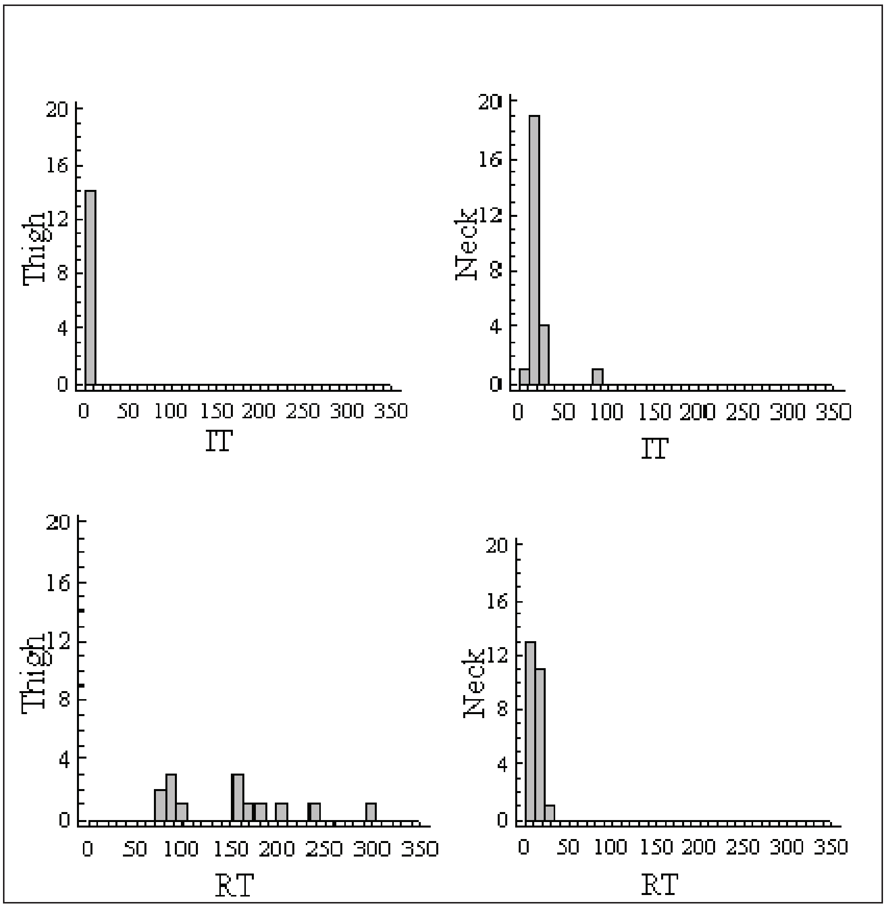
Figure 1: Frequency histograms for the variables IT and RT (seconds) for one-week old and four-week old live animals.



It is seen in figure 1 that five very high values were obtained for recovery time (RT), four on one-week old animals and one on a four-week old, all of them with the transponder injected into the inguinal zone. In the one-week old animals these very high values occurred with the transponder located inside the abdominal cavity. This is because in the first week of life it is difficult to know if the transponder has been injected subcutaneously or inside the abdominal cavity. The high recovery time on a four-week old animal was because the transponder was located in the muscle of the inguinal zone. Ribó *et al*., (1995) found in sheep that there was sizeable migration of the transponder in the inguinal zone. The mean recovery time, excluding outliers, was significantly greater for animals injected at four-weeks, but this difference was not relevant (23.79± 2.13s and 32.48 ± 2.13s for 1 and 4 weeks). Neither the location of the transponder not whether the transponder was new or re-used, not the interaction between age and transponder location were significant. If the analysis is made with the outliers included, the recovery time for transponders injected into the groin is considerably greater (65.52 ± 12.28s in the groin and 24.64 ± 11.60s in the ridge between the shoulders). Age and interaction between age and transponder location were not significant. Conill *et al*., (1997), observed on cattle calves that transponder injection in the axilla, which leads to handling difficulties similar to that in the groin, results in greater recovery time (75 ± 7s) versus the base of the ear (52 ± 5s) and the lip (27 ± 2s).

Figure 2 shows the frequency histograms for the variables IT and RT for carcasses with the transponder injected into the thigh and the neck.

Figure 2: Frequency histograms for the variables IT and RT (seconds) for carcasses with the transponder injected into the thigh and the neck.



IT values for carcasses are nearer the trend, except for one carcass where the transponder was injected into the neck which had a high injection time (85s) because of handling difficulties, and was discarded for analysis in the calculation of minimum squares shown in table 2. The mean transponder injection time in the thigh was significantly lower than in the neck (table 2). In the recovery time histograms it is seen that values are very near the trend if the transponder is injected into the neck, but there is a large variability of data if the transponder is injected into the thigh. Although the significance test for the variable RT may not be valid, given the large variability of this characteristic and the limited sample size, the great difference in times observed and their likewise considerable variability, leads us to recommend the neck as the transponder injection location in carcasses. Furthermore, recovery of transponders injected into the neck reduces carcass value by less.

The advantages of identification by means of transponders versus present methods are its great reliability and that it is harmless. Its high price (5€ per unit) is a disadvantage. It may be useful on animals of high economic value, for animal identification in growth experiments, in studies of carcass or meat quality, and in general when sure identification and individual readings is required.

Table 2. Averages by minimum squares, in seconds, for the variables injection time (IT) and recovery time (RT) of transponders in two different locations: the neck and the thigh.

	Thigh	Neck	Sig.
IT	5.14 (0.94)	19.13 (0.72)	**
RT	150.29 (10.69)	12.76 (7.99)	**

** $p<0.05$

CONCLUSIONS

The results demonstrate that identification of live animals using transponders is straightforward and can be used at an early age (1 week). Furthermore it is a harmless method for the animal. Transponder injection is also a simple method for identification of rabbit carcasses, which provides reliable and permanent identification.

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