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NOTE:

Evaluation of Passive Integrated Transponders as a Marking Technique for Turkey Poults

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Injectable, passive integrated transponders (PITs) were evaluated as a marking technique for newly hatched wild turkey (*Meleagris gallopavo* Linnaeus) poults. Seven of 12, 3-day-old domestic turkey poults received a PIT implant and a wing tag. A control group of five poults received only a wing tag. Two subcutaneous implant sites were evaluated, along the right side of the neck and in the area between the right inner thigh and breast. One of 7 PITs failed or was expelled during the first week. Four scanning errors, in which the PIT was present yet not detected during the initial scanning attempt, occurred in 73 scanning attempts during a 12-week period. All scanning errors were abdominal implanted PITs. Two of 4 PITs implanted in the neck were destroyed during a shock test while none of the abdominal PITs were damaged. PITs seemed to be an efficient and reliable marking technique and have potential for field applications to wild turkeys.
INDEX DESCRIPTORS: turkeys, *Meleagris gallopavo*, transponders, PIT tags, marking techniques

Passive integrated transponders (PITs) have proven to be a viable and efficient marking method, particularly in laboratories, field studies of small mammals and fish, fish hatcheries and in a wide variety of wildlife protection programs. Fish (Prentice et al. 1988, Moore 1992), amphibians and reptiles (Camper and Dixon 1988), ferrets (Fagerstone and Johns 1987) and laboratory mice (Rao and Edmondson 1990) have been implanted with PITs. However, we were unable to locate any published studies evaluating PIT implants in birds and only found anecdotal reports provided by PIT manufacturers.

Many studies need to identify individual neonates or very small wildlife species. The rapid growth rate of newly hatched wild turkey (*Meleagris gallopavo* Linnaeus) poults prevents using the common marking techniques of leg-bands or wing tags. Because of the nature of their skin, turkeys cannot be individually marked with freeze branding, tattoos or identified based on feather/color patterns. Our objective was to determine the best implant site and to evaluate the effect, migration, identification accuracy, and integrity of PITs as a marking technique for newly hatched turkey poults.

METHODS

Twelve, 2-day-old domestic turkey poults were obtained from a local hatchery on 27 August 1992. The poults were placed in a 2 × 2 m confined area inside a larger cement-floored building. At 3 days of age, 7 poults were selected at random, wing-tagged with an 18 × 5 mm numbered, metal wing tag designed for 1-day-old domestic chickens and implanted with a 12 × 2 mm cylindrical PIT (IMI model 1000, Bio Medic Data Systems Inc.) subcutaneously in either the neck (4 poults) or abdomen (3). Five poults received only the wing tag. Poults were returned to the pen and given commercially prepared gamebird feed containing 22% protein (Land-O-Lakes) and water ad libitum. Poults remained within the building for 7 weeks and were allowed access to a 3 × 6 m open-air flight pen during 5 additional weeks. A portable scanner (model PSR 2000, Bio Medic Data Systems Inc.) was used during all 12 weeks in a blind test to determine poults with PITs, the location of the PIT and its identification number. One observer would randomly capture, restrain and lay a poult on its left side with its head to the scanner operator's right. A scanner operator unaware of the poult's treatment status (with or without a PIT), would grasp the poult's head and extend the neck by gentle traction while scanning the neck. If a PIT was not detected, the operator would then grasp the poult's right leg and extend and lift the leg while scanning the area between the breast and thigh. If a PIT was not detected in either implant site, the poult was recorded as a non-implanted control. The wing-tag number was then read and compared to the poult's treatment status to document any scanning errors. If the status indicated that a PIT was present but was not detected during the initial scan, a second scan was conducted to determine if the PIT had failed or if the observer had missed detecting the PIT. Each poult was then weighed to the nearest 0.01 kg on a digital bench scale (Ohaus series 5). Average weight of each treatment group (PIT versus no PIT) was determined weekly and the final average weights were compared by a Student's t-test. Poults with PITs were sacrificed at 12 weeks to evaluate the feasibility of detecting and recovering PITs from harvested wild turkeys. Since the PIT is encased in glass, there was concern that the PIT would not function after being subjected to the shock associated with the turkey being shot. Each poult was shot at 20 m with a 7.7 cm, 12-gauge shotshell containing 57.1 g of #6 copper-plated, buffered shot constricted by a 17.2 mm choke. All poults were shot in the upper neck near the base of the head. Shots into a turkey's body are seldom immediately fatal, therefore hunters typically shoot at the neck near the base of the head. After being shot, each poult was immediately scanned for a PIT and compared to its treatment status. All PITs were surgically removed during field necropsy to document location, condition of the PIT and condition of body tissue at the implant site.

RESULTS

Implanting the PIT required < 30 seconds once the poult was restrained. It required less time to implant the PIT in the neck because the head and neck could be restrained and oriented quickly and loose skin on the neck allowed the implanting needle to be rapidly and accurately positioned. More effort was required to restrain and orient the poult during an abdominal implant and it was more difficult to insert the PIT implanting needle subcutaneously beneath the taut abdominal skin. Additionally, the shape of the PIT implanting device facilitated using the neck site rather than the abdomen.

One PIT failed or was expelled during the first week. This PIT was implanted in a poult that died due to infection caused by improper placement of the PIT. The implant needle had punctured the abdominal wall when the PIT was initially deployed. We were unable to locate the PIT in the poult during a necropsy so assumed the PIT had been expelled through the implant wound before the first weekly scan.

Four scanning errors, in which the PIT was present yet not detected during the initial scanning attempt, occurred in 73 scanning attempts during the 12-week period. All scanning errors were of PITs implanted abdominally. All PITs were detected on the second scanning attempt. No false positive readings were obtained during 51 scans of poults without PIT implants.

The weekly average weight for treatment groups was similar. At 12 weeks there was no difference ($\underline{t} = 0.18$, 7 df, $\underline{P} = 0.86$) between the average weight of poults with PIT implants (5.51 kg) and those without implants (5.44 kg). Three poults died during the 12-week period, 1 with a PIT at 16 days (described above) and 2 without PITs at 25 and 44 days. The cause of death for the 2 control-group poults was undetermined.

PIT implant sites did not become inflamed and poults moved, fed, and interacted with other poults immediately after the PIT was implanted. During the 12 weeks, we did not observe any differences between poult treatment groups in feeding, preening, or roosting behavior. PITs did not alter the external appearance of the poult and, therefore, other poults did not peck at the mark as occurs with shiny tags or radio-transmitter antennas (IDNR unpubl.).

All PITs were removed at 12 weeks. There were no indications of tissue rejection, inflammation, or hemorrhaging at the implant sites and all PITs were encapsulated by subcutaneous connective tissue. All PITs implanted in the neck remained near the initial implant site and were palpable prior to necropsy. However, abdominally implanted PITs seemed to have moved ventrally and were not palpable prior to necropsy. These PITs were difficult to locate and recover during necropsy. We were unable to determine if the PITs had migrated from the implant site during the 12 weeks or if poult growth had altered the juxtaposition of the PIT relative to the initial implant site.

Two of the 4 PITs implanted in the neck were physically destroyed during the shooting test whereas none of the abdominal PITs were damaged. In both cases in which a PIT was destroyed, the poult was shot on the right side and the PIT was hit by a pellet. The other 2 poults with neck-implanted PITs were shot on the left side and both PITs functioned properly afterwards. Neither of the abdominally implanted PITs were affected by the shock even though both turkeys were shot on the right. The shock associated with the turkey being shot did not cause any PITs to malfunction, but the PITs obviously were unable to withstand direct pellet hits.

Poults did not lose any wing tags during the 12-week period. However, all poults had inflammation and tissue deterioration of the wing web at the puncture site and encapsulating tissue growth occurred along the tag length.

DISCUSSION

One of 7 PITs failed or was expelled through the implant incision, but that might have been prevented had the PIT been implanted correctly. Camper and Dixon (1988) had only 1.1% failure rate for similar PITs implanted in amphibians and reptiles. We considered a scanning accuracy of 95% was acceptable since no operator errors were possible in recording identification numbers. All PITs were detected on the second scan attempt. Orientation of the hand-wand was critical for PIT detection, especially for abdominally located implants. Camper and Dixon (1988), who reported a first-pass scan accuracy rate of nearly 92%, stated that the orientation of the PIT to the hand-wand affected this rate.

The neck proved to be a better implant site than the abdomen for ease of implant, scanning accuracy, and minimal migration of the PIT from the implant site. The abdominal location provided the best protection for PITs in turkeys that were shot. Alternate implant sites are available and information provided by manufacturers of PITs suggest the optimal implant site for avian species is intramuscular in the pectoral mass. However, we were concerned about causing significant tissue damage, interfering with flight, and the potential for human consumption if the pectoral mass was used for the implant site in wild turkeys. For the 2 implant sites we evaluated, the neck site appears more appropriate than the abdomen to prevent accidental human ingestion, since the upper portion of the neck is usually discarded when a wild turkey is prepared for consumption. Although half of the neck-implanted PITs were destroyed during the shooting test, we feel the advantages of using the neck for the implant site outweigh the disadvantages, especially for turkey hens that have low harvest rates and poults that may be recaptured at maturity.

The requirement of physically handling the turkey for scanning purposes, PIT cost, and potential human consumption of PITs are negative factors that should be considered prior to using PITs in large-scale field projects. Despite these problems, this technique may be superior to other traditional marking methods for turkey research requiring long-term identification, and it has obvious applications to marking wild turkey poults. Harvest rate studies, where there is concern of hunter selection bias for or against obviously marked individuals and behavioral studies where the marker influences brood mate behavior, could both benefit dramatically from this technique.

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REFERENCES

CAMPER, J.D., and J.R. DIXON. 1988. Evaluation of a microchip marking system for amphibians and reptiles. Texas Parks and Wildl. Dept., Res. Publ. 7100-159:1-22.

FAGERSTONE, K.A., and B.E. JOHNS. 1987. Transponders as permanent identification markers for domestic ferrets, black-footed ferrets, and other wildlife. J. Wildl. Manage. 51:294-297.

MOORE, A. 1992. Passive integrated transponder tagging of channel catfish. Progressive Fish-Culturist 54:125-127.

PRENTICE, E.F., T.A. FLAGG, and C.S. McCUTCHEON. 1988. A study to determine the biological feasibility of a new fish tagging system. Ann. Rpt. to the Bonneville Power Admin., Portland, Oregon.

RAO, G.N., and J. EDMONDSON. 1990. Tissue reaction to an implantable identification device in mice. Toxicologic Pathology 18:412-416.