Improving Treatment Outcomes for Bobtail Lizards Through Collection and Analysis of Physical Measurements

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Abstract

Our study demonstrates that weight and length measurements are used to flag potential health issues and is a useful diagnostic tool. In the 5 years since its inception, the study has evaluated over 1000 bobtails and has contributed to the improvement of current treatment protocols at Kanyana Wildlife.

The measurements taken include: tip of nose to tip of tail, vent to tail tip, and weight. These measurements are used to determine the age and health status of bobtails and allow for the appropriate treatment to be determined and administered quickly by people who are unfamiliar with bobtails.

Around a third of Kanyana's bobtail admissions present with an Upper Respiratory Tract Infection (URTI). URTI is difficult to diagnose in its early stages. The weight / length relationship derived from our data has proved effective in identifying URTI cases and tracking their recovery.

Results are assessed annually to confirm that the accuracy of the initial relationship has remained valid for Baby, Juvenile and Adult patients and to look for longer term trends in bobtail health.

The effort of collecting and analysing basic data not only met the initial goal of helping treatment personnel quickly identify sick animals but has proved sufficiently reliable to underpin external research initiatives not initially anticipated.

Keywords: Shingleback, Bobtail, *Tiliqua rugosa*, URTI (Upper Respiratory Tract Infection), Nidovirus, Data Mining

Introduction

Initially I had a reasonable knowledge of bobtail health but little idea of the weight for a given length expected of healthy specimens. On searching the literature for information on size and weight, it became clear little had been published and most articles referred to East Coast bobtails [1]. It also appeared there were significant differences to our WA specimens. In addition, only average sizes were quoted in the range 32-45 cm, but no detailed data were presented [2]. There seemed no alternative but to start collecting measurements to build Kanyana's own database.

Ruth Haight, my predecessor as Bobtail Coordinator at Kanyana, taught me a huge amount about bobtail diagnosis and care. Ruth had been taking measurements of baby bobtails born at Kanyana since 2004 [3]. These measurements were used to ascertain whether the babies born in care were premature and in need of specialised care. Ruth's baby bobtail measurements were the starting point for my data collection.

Kanyana already routinely weighed all admissions as part of their admission protocols and to monitor progress throughout their treatment. Since 2012 we have also been recording the length from tip of nose to tip of tail for the total length, plus the distance from vent to tail tip.

At the outset there were 2 objectives for collecting the length data:

- Improve knowledge about age at admission to improve care at times of high triage.
- Optimise time in care through better understanding of release criteria than the arbitrary weight target historically used.

Materials and Methods

All measurements were taken on site at Kanyana Wildlife Rehabilitation Centre according to guidelines developed by the author. Bobtails were placed on the treatment counter and measured following methods detailed below. Over time, the method used to measure the bobtails was refined to give the most accurate results. To date there have been 3 versions of data collection and measurement tools used.

Version 1: Using the same measurements started by R. Haight's original data on baby bobtails, a 30 cm ruler was used to measure the bobtails from tip of the nose to tip of the tail and from the vent to the tip of the tail. These data were recorded in an Excel spreadsheet. This method was used to collect data for 18 months and then the data were analysed to look for a correlation in weight and length to determine age.

Version 2: Measurement protocol was updated to use a 45 cm ruler and digital callipers introduced for measuring. Jaw width and hip width measurements were added but have not yet been analysed in detail.

Version 3: Same instruments were used as in Version 2. Measurement of thickness (top to bottom) of hips was introduced then removed as it became clear the length and width were always equal. Tail thickness top to bottom measurement of tip of tail, counting number of scales from the white scales after the hips to the tail tip was added to the protocol.

Over 1600 bobtails have been measured to date. A summary of each year's data is undertaken in Excel, the results reported at Kanyana's annual meeting and used in training courses.

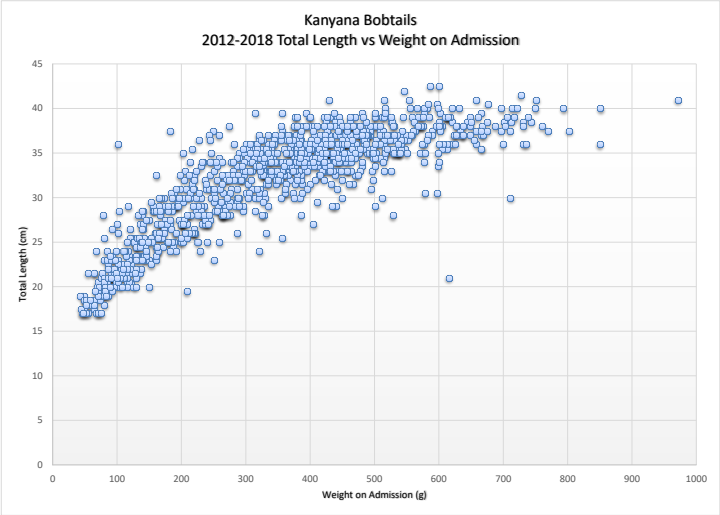
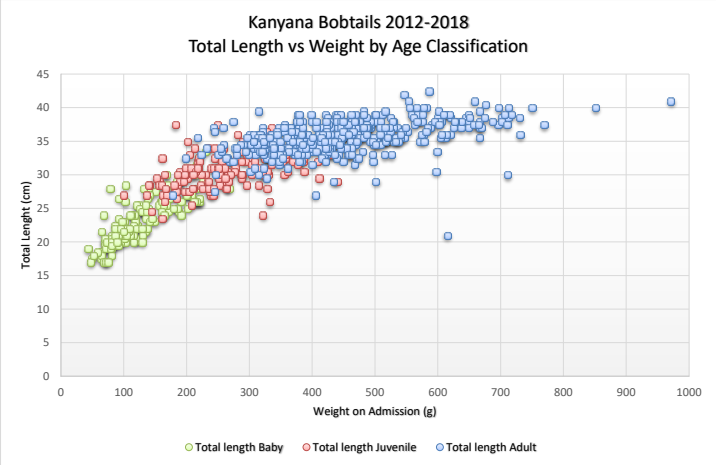


Figure 1 – Total Length vs Weight – All Data

Results

Age of Bobtails

The results from the measurements taken show that the length of bobtails can be used to determine whether they are a baby, juvenile or adult bobtail. Baby bobtails are defined by a length between 20-26cm, juvenile bobtails 26-32cm and adults are 32cm and above as shown on Figure 2.



Weight of Bobtail	Length of Bobtail (snout to end of tail)			
	¤	<·20cm·–·26cm¤	26-·32cm¤	32-·40cm·+¤
	¶ 100·–·250g¤	Baby·(0·–·1.5years)¤	Underweight·–·Send·to·iso·(parasite·or·URTI)·Collect·faecal¤	Very·underweight·-·Send·to·iso·(parasite·or·URTI)Collect·faecal¤
	250·–·400g¤	Fat/·obese¤	Juvenile·(1.5·–·4years)¤	Underweight·–·consider·send·to·iso·(parasite·or·URTI)·Collect·faecal¤
	400·–·600g·+¤	X¤	Fat/·obese¤	Adult·(4·years+)¤

Figure 2 – Total Length vs Weight – Classified by Age

Initial Assessment Sheet

Age classifications were incorporated in the Initial Assessment Sheet to identify healthy vs unhealthy bobtails by weight and length.

Detecting Illness

Noting ill bobtails generally present underweight, it became possible to identify subclinical disease and avoid extended quarantine for healthy bobtails of all ages. This is shown in Figure 3 where bobtails with URTI weight plots to the left of the overall trend.

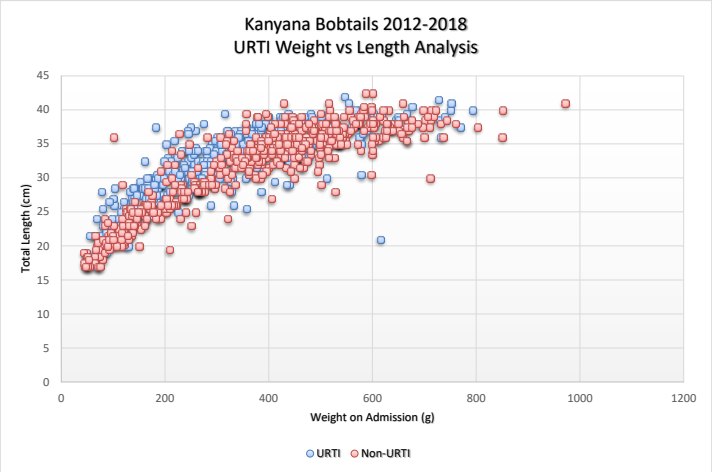


Figure 3 – Total Length vs Weight – URTI vs Rest of Population

Discussion

The measurement of bobtails using simple measurement techniques and basic analysis has enabled us to make informed treatment decisions and improve bobtail care at Kanyana. Confirming that the length and weight of bobtails could be used to identify their age group meant that we were able to decrease the time in care for baby bobtails by showing that the spring admissions were the same length and weight on average as the baby bobtails born in care. This led us to the conclusion that keeping them until they reached a juvenile weight was unnecessary. A better understanding of what size and weight is healthy has also helped us to refine our feeding regimes by avoiding overfeeding and reducing time in care.

Bobtail flu was first diagnosed at Kanyana in 1996 [4]. This disease results in a number of symptoms including loss of condition and weight – often before any other symptoms appear.

This led to the development of an Initial Assessment Sheet which is used at Kanyana to assess bobtails on admission and helps to ensure they are treated correctly, reducing time in care and quarantine breaches. Prior to being able to identify early URTI affected bobtails from weight/length measurements, their treatment may have been delayed or URTI inadvertently spread to healthy patients when housed together.

The results show that URTI bobtails have a lower body mass on admission compared to non-URTI bobtails and this weight difference can be used to identify subclinical cases of URTI. This discovery has helped to identify acute vs chronic cases and has been used in the research conducted by Murdoch University and lead to the discovery of the virus thought to be responsible for the disease [5].

Conclusions

The yearly analysis of these data, while initially done to satisfy curiosity, has proven to be helpful in determining which measurements are useful for identifying a bobtails age and health status and track trends in admission status and treatment outcomes.

The time and resources taken to collect measurements of bobtails has proven to be useful in improving our understanding, knowledge and rehabilitation of these lizards. We shall be continuing to collect, refine and utilise this information. The simple methods outlined here have the potential to be applied to other wildlife species and may assist in expanding knowledge, better treatment protocols and the subsequent care of other species.

The results of this work suggest that data collection nationwide would be of general benefit to wildlife carers and researchers alike. Sophisticated 'big data' analysis methods may yield more insights but are outside the skill set of most wildlife carers. An opportunity exists to develop a general cloud-based wildlife measurement database system to assist wildlife carers and support academic studies.

Kanyana has invested significant resources to collect and analyse bobtail weight and size data. This paper shows the benefits were significant and are on-going. The inferences from our data set are likely to only apply locally. On the other hand, methods as described in this paper are likely to be generally applicable to other species and locations.

Acknowledgements

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References

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