Improving the diet of Western Swamp Tortoises at Perth Zoo

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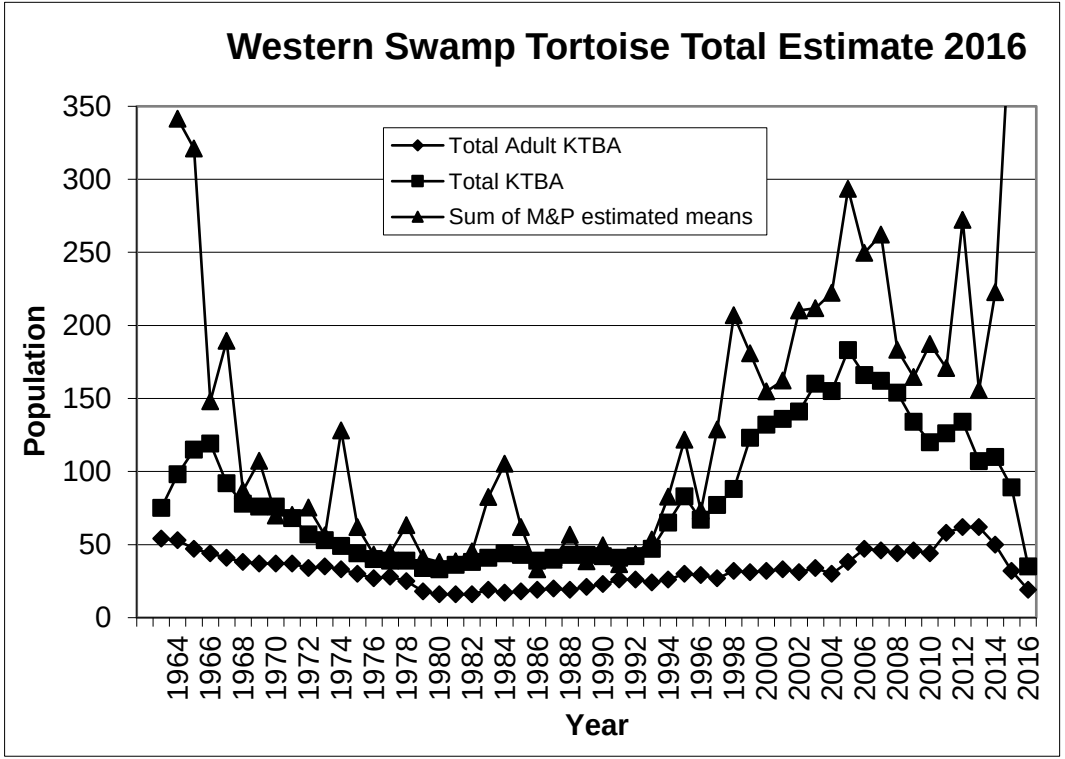
Western Swamp Tortoise (WST)

- Described from a specimen collected in 1901
- Presumed extinct by 1940s
- ‘Rediscovered’ in 1953
- Wild population less than 30 adults by 1980s


Western Swamp Tortoise Total Estimate 2016
Total Adult KTBA
Total KTBA
Sum of M&P estimated means
Population
Year
0
50
100
150
200
250
300
350
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016

Perth Zoo Captive Breeding Program

- Commenced in 1987
- Produced 1090 eggs so far
- Released 861 juvenile WST to the wild
- Established two new populations (Moore River and Mogumber Nature Reserves)
- Trialling an ‘assisted colonization’ site in D’Entrecasteaux National Park, 350 km south of Perth

WST diet in the wild

- Live invertebrates (mosquito larvae, *Daphnia*, polychaetes, oligochaetes)
- Tadpoles
- Diet is driven by seasonal availability – eat what is most common and can fit in their small mouths.
- Only feed on items in the water column, don't take food from the surface.

- Difficult to replicate 'natural' diet in the quantities Perth Zoo needs to feed ~200 WST at a time.

Artificial diet

- ‘Red’ meat based
- Original recipe included Ox heart and lab rats along with supplements

Concern that this diet may not match the wild diet very well.

- Can only feed to WST older than 4 months as hatchlings only take live invertebrates (e.g. mosquitoe larvae, blackworm)
- Added issues of cost of lab rat supply and limited to a single supplier (a risk)

Artificial diet requirements

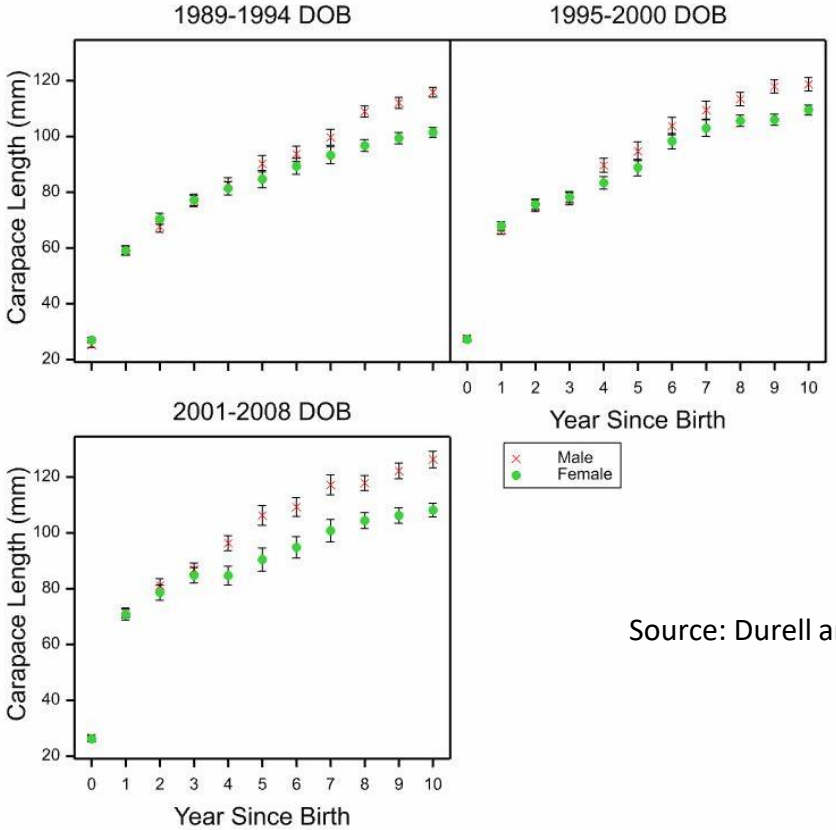
- Nutritious
- Made with fresh ingredients, stored frozen in bulk, fed out frozen – disease risk management
- Ease of ‘construction’
- Acceptable price

Life in the slow lane

Everything WST do happens slowly!

Aestivate for 6 months of the year when ephemeral swamps dry up.

Growth is steady, sexually dimorphic after Yr 4, and influenced by hatching weight.



Source: Durell and Keeley (2019). JZAR 7: 102-108.

Diet comparison

- 50% on ‘Red meat’ diet, 50% on ‘White meat’ diet
- Run for 4 years (2014/15 – 2017/18)
- Sample sizes: Hatchlings (n=199), juveniles (n=195) and breeding adults (n=88)
- Examined growth [mass (g) and straight carapace length (mm)]
- Growth during hydro-period and change in mass during aestivation
- Effect on reproduction (clutch size, clutch mass, hatchling mass)


sartorius
ON/OFF
CF
5.4 g
F1
F2


TOLEDO

Analyses

- Chemical analysis performed by WA Chem Centre
- ‘Red’ and ‘White’ diets very similar for protein, fatty acids, Ca, P, Vitamin content, trace elements
- Preliminary statistical analysis of growth rates shows no significant difference between the ‘Red’ and ‘White’ diets.
- Analysis of reproductive data pending

Other Lessons Learnt

- AAFCO and DEDIAF guidelines aren't much use in comparisons with WST diets.
- Software such as Zootrition® significantly over-estimated dietary constituents.