What do we feed the food?

Nutritional analysis of live feed insects

Kristofer Försäter, *Zookeeper ectotherms*, Karin Amsten, *Nutritional coordinator*, Bo Runsten, *Veterinary*
Stiftelsen Nordens Ark, Åby Säteri, SE-456 93 Hunnebostrand, Sweden
kristofer.forsater@nordensark.se, +46 (0)732 706353

BACKGROUND

It is well known that feeding insectivores in captivity is a challenge in terms of ensuring the right nutritional content required. Captive fed live food is not only poor in the number of different species provided but also poor in nutrients due to inadequate cultivation. Vitamins and minerals have a great importance in the successful breeding of many species, including amphibians, reptiles and birds. One of the most important minerals is calcium (Ca) and also the ratio between calcium and phosphorus (P), where a Ca/P-ratio between 1:1 and 2:1 is recommended.

After a few confirmed cases of decalcified amphibians and reptiles and with some concerns regarding the bone status on the white backed woodpeckers, we decided to do a thorough examination of our feeding regime for insectivores. After a review of our management routines we concluded that since the animals were held under optimal conditions otherwise, regarding light, temperature etc., the problems were most likely caused by nutritional deficiencies. Therefore we did a pilot study and analysed our live feed insects, to get a better understanding of what we are actually feeding our animals.

METHOD

The two most common live feed insects, meal worms (*Tenebrio molitor*) and crickets (*Gryllus bimaculatus*), were analysed. For both species we picked out a sample directly at arrival from the wholesaler and immediately euthanized the insects by freezing. The rest was put to a fast for 48h before they were divided into tree (*T.molitor*) resp. five (*G.Bimaculatus*) test groups. Each group were fed according to Table 1 for 48h and thereafter euthanized by freezing. All diets were commonly used on the institution.
The groups that were dusted with a supplement, was kept for another 10-15 minutes to mimic the loss of supplement through grooming and scrubbing, which normally occurs in a terraria.
Each sample contained 30g of insects (see Figure 1) and they were sent to ALS Scandinavia AB for analysis of calcium (Ca) and phosphorus (P) content.

Table 1: Test groups for two species of live feed insects with assigned diets

Species	Tenebrio molitor	Gryllus bimaculatus
Test groups	T1: None (at arrival)	G1: None (at arrival)
	T2: Chicken starter food	G2: Fishflakes and carrots
	T3: Chicken starter food + *dusted* Ca-supplement	G3: Commercial gut loading feed
	T4: Commercial gut loading feed	G4: Commercial gut loading feed + *dusted* Ca-supplement
		G5: Commercial gut loading feed + *dusted* Ca/Mg-supplement
		G6: Commercial gut loading feed + *dusted* Ca/D3-supplement

RESULTS

The Ca/P-ratio was drastically changed after gut loading both for crickets and meal worms. From a Ca/P-ratio on 1/21,4 at arrival for the meal worms to 3,3/1 with gut loading. The crickets had a Ca/P-ratio of 1/4,8 at arrival and 2,3/1 after gut loading. For more results, see **Figure 1** and **Figure 2**.

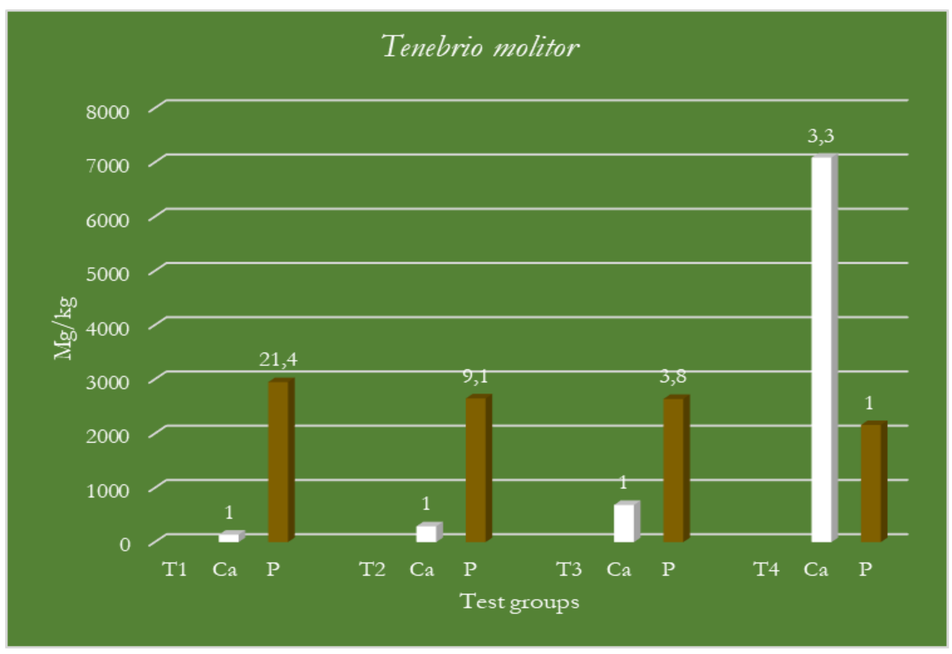

Figure 1: Ca/P-level in meal worms (Tenebrio molitor) given different diets (Ca/P-ratio noted above each bar)

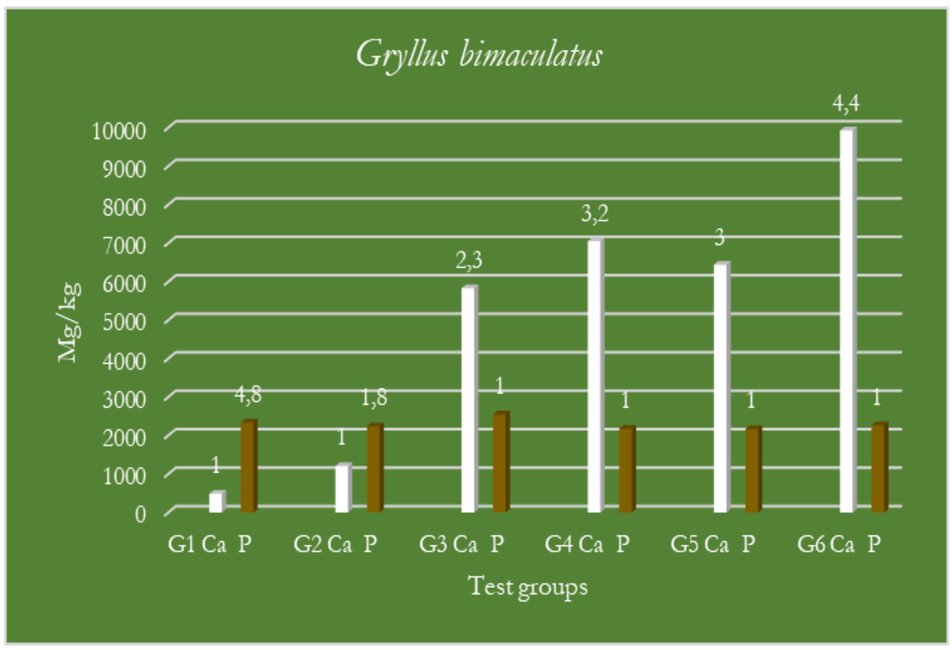

Figure 2: Ca/P-level in crickets (Gryllus bimaculatus) given different diets (Ca/P-ratio noted above each bar)

CONCLUSIONS

Gut loading with the commercial gut loading feed used in this study, were sufficient to ensure the right Ca/P-ratio in live feed insects. The use of other Ca-supplements was in this case therefore unnecessary. Even though gut loading is quite expensive, we are now regularly using this method to ensure the health of our amphibians, reptiles and birds. To strengthen this results we need a larger sample of insects and we are also planning to do the same analysis for other minerals and also vitamins (i.a. vit A-retinoids).