The Pro's and Con's of Mealworms as a food for reptiles

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For many reptile keepers, supplying a reliably available source of live food for their insectivorous reptiles is a challenge. This means that many rely of what is available with an expectation that it is also good nutritionally. Unfortunately that is not always the case.

Mealworms are the larval stage of a beetle (Tenebrio molitor). Whilst availability and ease of culture are their major advantages, they fall very short in many ways.

The nutrional content of the average mealworm is as follows:

FOOD	%PROT	%FAT	Ca	Phos	Ca:P ratio
mealworm	20- 22.3	12- 14.9	133ppm	3345ppm	1:25
cricket	55.3	6	345ppm	4238ppm	1:12

The primary issues to consider are the lower protein levels, higher fat and appalling Calcium:Phosphorous ratios. Please note that from a Ca:P point of view, crickets are no award winners either but at least they have some things going for them.

The ideal Ca:P ration is 1:1.3. The reason we get so hung up on Ca:P ratios is that the body determines how much calcium it needs to absorb based on phosphorous levels in the blood. In a situation like we see in the mealworm, not only is very little calcium available, but the body is tricked into thinking it doesn't need it by the gross imbalance of phosphorous.

There are ways that we can attempt to improve Calcium levels (but we can't reduce Phosphorous levels). Dusting of the mealworms with calcium powder prior to feeding is not terribly efficient as the shiny exoskeleton does not hold a lot of it for any length of time.

Gut loading (or feeding calcium to the mealworm prior to feeding it to the animal) has its limitations. Primarily, the higher the calcium content of the "gut load", the more unpalatable (and often metabolically toxic) it is to the mealworm. Secondly, the gut size of a mealworm is such that improvements are at best marginal.

How the mealworm is bred also has its issues.

Phytic acid or cereal phytates are concentrated in the aleurone layer of the seed coat of all cereal grains. This is third outermost layer of the seed coat (2^{nd} is the testa, 1^{st} is the pericarp). These three layer are what makes up the product we know as bran once processed. Cereal phytates have the property of being able to immobilise dietary calcium and magnesium i.e the phytates bind to calcium and magnesium and form insoluble complexes that are not readily absorbed. Calcium is therefore not removed from the reptiles body BUT it is prevented from entering the reptiles body in the first place. When we consider that mealworms are very low in calcium in the first place it is safe to consider that virtually none of this will be available to the reptile if the mealworm also has a gutful of phytate rich cereal bran when it is fed to your reptiles. Not all cereal grains have the same level of phytates in their aleurone. The highest levels are found in oats, followed by barley, rye, wheat and lastly millets.

In order to feed our mealworms (and maggot cultures) on a substrate that has reduced phytate levels is to therefore prudent to use a cereal based product not made from the seed coat. Two products are recommended. **Pollard** (or wheat fines) are processed from the endosperm (the starchy central part of wheat) and therefore have significantly reduced phytate level. The disadvantage of pollard is that many manufacturers produce it very fine which makes it (in my hands) too "gluggy" for maggot substrate BUT excellent for mealworms as it is easier to sieve. In addition, on a personal note, I do not suffer from hayfever when working with pollard but I most certainly do with bran. Some manufacturers produce a coarse pollard which is excellent for both purposes. **Mill Run** is an alternative product which has a coarseness suitable for both maggots and mealworms. It is made up of coarser pollard with remnants of bran. I use is by preference as its texture is always ideal for maggots, it has about 6% more protein than bran (which is essential protein for use by the mealworms or maggots) and it doesn't flare up my hayfever.

In addition to the calcium issues, the high fat content of mealworms has obvious disadvantages.

The tough exoskeleton of the mealworm can be difficult to digest and impactions of the gut from undigested mealworm skins is not uncommon. This can be partly alleviated by only feeding very small mealworms or by feeding "white" (freshly shed) mealworms.

My usual recommendation is that mealworms should comprise no more than 10% of the diet and that it is better to feed them smaller rather than larger.