



Fig. S1. When given a choice between a food high in protein (35P:7C) or one high in carbohydrate (7P:35C), locusts in either a carbohydrate- or protein-deprived state selected the nutritional complement.

Table S1. Chemistry of both grasses over the duration of the experiment. Replicates are days (n= 9) with all parameters determined from five separate samples per day. Values given are for means \pm SEM and *P* values from ANOVA.

	<i>T. triandra</i>	<i>P</i>	<i>T. aestivum</i>	<i>P</i>
<i>Parameter</i>				
Water (g.g ⁻¹ dry matter)	1.6 \pm 0.02	0.338	7.8 \pm 0.06	0.361
Protein	7.9 \pm 0.4	0.124	13.4 \pm 0.5	0.102
Non-structural carbohydrate	23.7 \pm 0.5	0.733	12.8 \pm 0.4	0.571
Ratio P:C	1:2.9	0.230	1:0.9	0.137

Table S2. Water loss and metabolic changes of the grass blades after 24h at 32°C and 38°C. Metabolic changes, in terms of total dry mass, protein and carbohydrate were quantified after Bowers et al. (1991) except that the dry mass initially was calculated from a regression of fresh mass against dry mass for a known sample rather than a ratio of fresh mass/dry mass. The values are expressed relative to that predicted from a subset of grasses taken initially (time = 0). A value of 1 indicates no change, while a value greater than 1 indicates the leaf material has gained dry mass (or protein or carbohydrate) compared to that initially predicted, and values less than 1 indicate that there has been a loss. Values given are means \pm SEM and *P* values are from ANOVA.

<i>Room temperature</i>	32°C	<i>P</i>	38°C	<i>P</i>
<i>T. triandra</i>				
<i>Parameter</i>				
Water	0.97 \pm 0.02	0.154	0.95 \pm 0.02	0.137
Total dry matter	1.02 \pm 0.02	0.406	1.00 \pm 0.01	0.865
Protein	0.96 \pm 0.03	0.215	0.96 \pm 0.04	0.352
Non-structural carbohydrate	1.01 \pm 0.03	0.810	0.97 \pm 0.02	0.251
<i>T. aestivum</i>				
<i>Parameter</i>				
Water	0.97 \pm 0.07	0.063	0.71 \pm 0.13	0.080
Total dry matter	1.00 \pm 0.03	0.965	0.96 \pm 0.03	0.069
Protein	0.99 \pm 0.04	1.00	0.99 \pm 0.04	0.391
Non-structural carbohydrate	0.99 \pm 0.06	0.799	0.99 \pm 0.07	0.215

Reference

Bowers M.D., Stamp N.E. & Fajer E.D. (1991). Factors affecting calculation of nutritional indices for foliage-fed insects: An experimental approach. *Entomol. Exp. Appl.*, 61, 101-116.