

Online Supporting Material

Supplemental Table 1. Formulation of fructose/glucose and sucrose diets¹.

Fructose/glucose diet (TD.05668) 25% kcal from glucose + fructose					
Ingredient	g/kg	% Weight	Protein g/kg	Carbohydrate g/kg	Fat g/kg
Wheat, Hard Ground	335.0	33.5	46.6	178.9	6.0
<i>Dextrose</i> , Monohydrate (Cerelese)	111.0	11.1	0.0	101.2	0.0
<i>Fructose</i>	101.0	10.1	0.0	101.0	0.0
Corn, Ground	95.0	9.5	7.7	65.7	3.0
Corn Gluten Meal 60	50.0	5.0	30.4	12.7	1.1
Soybean Meal, 48%	200.0	20.0	96.6	51.0	1.8
Dicalcium Phosphate, FG	16.0	1.6	0.0	0.0	0.0
Calcium Carbonate, FG	13.0	1.3	0.0	0.0	0.0
Sodium Chloride NaCl	5.0	0.5	0.0	0.0	0.0
Mineral Mix, TD.80318	1.5	0.2	0.1	0.7	0.03
Vitamin Mix, TD.81125	3.0	0.3	0.1	0.8	0.04
TBHQ (Antioxidant)	0.01	0.001	0.0	0.0	0.0
Corn Oil	40.0	4.0	0.0	0.0	40.0
Cellulose (Fiber)	29.5	3.0	0.0	0.0	0.0
Totals (g/kg)	1000	100	181.38	512.02	52.04
Summary Data	Total	Crude Fiber	Protein	Carbohydrate	Fat
Diet %	100	5.4	18.1	51.2	5.2
kcal/kg	3242.0	0.0	725.5	2048.1	468.4
kcal %	100	0.0	22.4	63.2	14.5
Sucrose diet (TD.05667) 25% kcal from sucrose					
Ingredient	g/kg	% weight	Protein g/kg	Carbohydrate g/kg	Fat g/kg
Wheat, Hard Ground	335.0	33.5	46.6	178.9	6.0
<i>Sucrose</i>	205.0	20.5	0.0	205.0	0.0
Corn, Ground	95.0	9.5	7.7	65.7	3.0
Corn Gluten Meal 60	50.0	5.0	30.4	12.7	1.1
Soybean Meal, 48%	200.0	20.0	96.6	51.0	1.8
Dicalcium Phosphate, FG	16.0	1.6	0.0	0.0	0.0
Calcium Carbonate, FG	13.0	1.3	0.0	0.0	0.0
Sodium Chloride NaCl	5.0	0.5	0.0	0.0	0.0
Mineral Mix, TD.80318	1.5	0.2	0.1	0.7	0.03
Vitamin Mix, TD.81125	3.0	0.3	0.1	0.8	0.04
TBHQ (Antioxidant)	0.01	0.001	0.0	0.0	0.0
Corn Oil	40.0	4.0	0.0	0.0	40.0
Cellulose (Fiber)	36.5	3.6	0.0	0.0	0.0
Totals (g/kg)	1000	100	181.38	514.84	52.04
Summary Data	Total	Crude Fiber	Protein	Carbohydrate	Fat
Diet %	100	5.1	18.1	51.5	5.20
kcal/kg	3253.3	0.0	725.5	2059.4	468.4
kcal %	100	0.0	22.3	63.3	14.4

¹ Compositions of the mineral and vitamin mixes used in these diets are found in Supplemental Table 2.

Online Supporting Material

Supplemental Table 2. Composition of mineral and vitamin mixes used in experimental diets¹.

Mineral Mix (TD.80318)	
Ingredient	g/kg
Cobalt Carbonate, FG (46%)	0.6
Copper Sulfate, FG (25%)	13.4
Ferrous Sulfate, heptahydrate, FG (20%)	133.3
Magnesium Oxide, FG (58%)	55.3
Manganous Oxide, FG (60%)	111.2
Potassium Iodate	1.7
Zinc Oxide, FG (72%)	20.4
Corn	664.1
Total	1000
Vitamin Mix (TD.81125)	
Ingredient	g/kg
Biotin, FG (1%)	5.0
Calcium Pantothenate, FG (73 g/kg)	24.8
Choline Chloride, FG (60%)	416.5
Folic Acid	1.2
Niacin, FG (99.5%)	17.1
Pyridoxine HCl	1.5
Riboflavin, FG (45 g/kg)	7.9
Thiamin Mononitrate	5.2
Vitamin A Acetate, FG (650 IU/mg)	3.7
Vitamin B12, FG (136 mg/kg)	10.1
Vitamin D3, cholecalciferol, FG (400 U/mg)	4.2
Vitamin E Acetate, FG (57 U/g)	60.5
Vitamin K, MSB complex, FG (29 g/kg)	64.5
Corn	377.9

Online Supporting Material

Supplemental Table 3. Summary of mixed model results for weight and food intake of fructose/glucose and sucrose-fed mice within metabolic cages¹

Weight		LMM (Intercept at day 6; groups (<i>n</i>) = 9; observations = 136)		
<i>Random effects</i>	<i>Variance</i>	<i>Std. Deviation</i>		
Individual (Intercept)	2.64	1.62		
Individual (Slope)	0.001	0.030		
<i>Fixed effects</i>	<i>Estimate</i>	<i>Std. Error</i>	<i>Z value</i>	<i>Pr(> z)</i>
Intercept	10.5	0.91	11.58	<0.0001***
Diet (Sucrose)	1.57	1.12	1.40	0.20
Time (Days)	0.094	0.016	5.77	0.0007***
Food Intake (g/day)	0.396	0.106	3.74	0.0003***
Diet (Sucrose) x Time	0.012	0.022	0.55	0.60
Food Intake		LMM (Intercept at day 6; groups (<i>n</i>) = 9; observations = 136)		
<i>Random effects</i>	<i>Variance</i>	<i>Std. Deviation</i>		
Individual (Intercept)	0.030	0.172		
<i>Fixed effects</i>	<i>Estimate</i>	<i>Std. Error</i>	<i>t value</i>	<i>Pr(> t)</i>
Intercept	2.01	0.46	4.33	0.0022**
Diet (Sucrose)	-0.10	0.21	-0.49	0.63
Time (Days)	0.001	0.006	-0.23	0.82
Weight	0.107	0.036	2.98	0.0163*
Diet (Sucrose) x Time	-0.001	0.007	-0.12	0.90

¹ * Indicates a p value < 0.05., ** <0.01, ***, <0.001. LMM, linear mixed-effects model

Online Supporting Material

Supplemental Table 4. Summary of mixed model results concerning competitive ability, reproduction and body weight within OPAs for mice on the fructose/glucose and sucrose pre-competition diets ¹

Male Competitive Ability		GLMM with binomial distribution and logit link (Intercept at week 0; groups (n) = 6; observations = 112)			
<i>Random effects</i>	<i>Variance</i>	<i>Std. Deviation</i>			
Population (Intercept)	0.0518	0.2276			
<i>Fixed effects</i>	<i>Estimate</i>	<i>Std. Error</i>	<i>Z value</i>	<i>Pr(> z)</i>	
Intercept	-0.422	0.228	-1.85	0.06	
Initial Diet (Sucrose)	-0.284	0.292	-0.97	0.33	
Time (Weeks)	-0.018	0.014	-1.33	0.18	
Initial Diet (Sucrose) x Time	0.006	0.019	0.32	0.75	
Female Reproduction		GLMM with Poisson distribution and logarithmic link (Intercept at week 8; groups (n) = 6; observations = 60)			
<i>Random effects</i>	<i>Variance</i>	<i>Std. Deviation</i>			
Population (Intercept)	0.066	0.256			
Population (Slope)	0.001	0.023			
<i>Fixed effects</i>	<i>Estimate</i>	<i>Std. Error</i>	<i>Z value</i>	<i>Pr(> z)</i>	
Intercept	2.84	0.13	22.01	<0.0001***	
Initial Diet (Sucrose)	0.339	0.098	3.48	0.0005***	
Time (Weeks)	0.002	0.011	0.22	0.83	
Initial Diet (Sucrose) x Time	-0.003	0.006	-0.40	0.69	
Male Reproduction		GLMM with Poisson distribution and logarithmic link (Intercept at week 8; groups (n) = 6; observations = 60)			
<i>Random effects</i>	<i>Variance</i>	<i>Std. Deviation</i>			
Population (Intercept)	0.168	0.410			
Population (Slope)	0.000	0.015			
<i>Fixed effects</i>	<i>Estimate</i>	<i>Std. Error</i>	<i>Z value</i>	<i>Pr(> z)</i>	
Intercept	2.28	0.19	11.80	<0.0001***	
Initial Diet (Sucrose)	0.332	0.129	2.57	†	
Time (Weeks)	0.013	0.009	1.50	†	
Initial Diet (Sucrose) x Time	-0.057	0.009	-5.99	<0.0001***	
Weight		LMM (Intercept at week 0) (Intercept at week 0; groups (n) = 160; observations = 706)			
<i>Random effects</i>	<i>Variance</i>	<i>Std. Deviation</i>			
Individual (Intercept)	9.102	3.017			
Individual (Slope)	0.001	0.034			
Population (Intercept)	0.140	0.375			
<i>Fixed effects</i>	<i>Estimate</i>	<i>Std. Error</i>	<i>t value</i>	<i>Pr(> t)</i>	
Intercept	22.0	0.53	40.96	<0.0001***	
Initial Diet (Sucrose)	-1.05	0.71	-1.47	0.14	
Sex (Male)	1.93	0.84	2.30	†	
Time (Weeks)	0.216	0.022	9.78	†	
Initial Diet (Sucrose) x Sex (Male)	0.55	1.13	0.48	0.63	
Diet (Sucrose) x Time	0.014	0.021	0.67	0.51	
Sex Initial (Male) x Time	-0.208	0.023	-8.90	<0.0001***	

¹ *** Indicates a p value < 0.001. † Indicates a p-value that is not provided, as its corresponding fixed effect is involved in a significant interaction. GLMM, generalized linear mixed model. LMM, linear mixed-effects model

Online Supporting Material



Supplemental Figure 1. OPA enclosure photograph. Enclosures are $\sim 30\text{m}^2$ and are subdivided into six sections by wire mesh. Each section has a food source (black tubes) and water (white and red vessels) in conjunction with nesting sites in either one of four “optimal” territories with housing in enclosed structures (blue bins) or two “suboptimal” territories with housing open to light (green boxes with wire lids). PIT tag readers on the exterior rim of the enclosure connect to antennae (black rackets), over each food source. Photograph courtesy Douglas Cornwall. OPA, organismal performance assay.