**Reconciling nutritional geometry with classical dietary restriction: effects of nutrient intake, not calories, on survival and reproduction.**

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Moatt et al Data S1 – Mortality Data

**FID** – Unique ID for each individual.

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Sex** – Sex of individual (M = male, F = female).

**Size** – Size classification of individual (L = large, S = Small).

**Level** – Provisioning level, values represent percentages of monthly *ad libitum* monitoring.

**Total\_eaten** – Total pellet eaten in g from the start of the experiment.

**Eaten\_wk** – Amount of pellet consumed that week (gweek-1).

**P\_tot** - Total protein eaten in g from the start of the experiment.

**P2\_total** – P\_tot2 squared (i.e. the total protein eaten squared).

**P\_wk –** Amount of protein consumed that week (gweek-1).

**P2\_wk –** P\_wk2 squared (i.e. the weekly protein intake squared).

**L\_tot** - Total lipid eaten in g from the start of the experiment.

**L2\_total** – L\_tot2 squared (i.e. the total lipid eaten squared).

**L\_wk –** Amount of lipid consumed that week (gweek-1).

**L2\_wk –** L\_wk2 squared (i.e. the weekly lipid intake squared).

**Weight** – Weight of fish from last weighing (g).

**Week\_F** – Experimental week.

**Status –** Survival status (0= alive, 1 = Dead).

**T\_group** – Time period of the experiment (see Fig. S1).

**Initial\_weight** – Initial weight of individual at the start of the experiment.

**ZP** – P\_wk z transformed (mean of 0 and standard deviation of 1).

**ZP2** – P2\_wk z transformed (mean of 0 and standard deviation of 1).

**ZL** – L\_wk z transformed (mean of 0 and standard deviation of 1).

**ZL2** – L2\_wk z transformed (mean of 0 and standard deviation of 1).

Moatt et al Data S2 – Predictions for Survival Surface: Males Period 1

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**P** – Hypothetical protein intake.

**P2** – Hypothetical protein intake squared.

**L** – Hypothetical lipid intake.

**L2** – Hypothetical lipid intake squared.

**ZP –** P z transformed (mean of 0 and standard deviation of 1).

**ZP2 –** P2 z transformed (mean of 0 and standard deviation of 1).

**ZL –** L z transformed (mean of 0 and standard deviation of 1).

**ZL2 –** L2 z transformed (mean of 0 and standard deviation of 1).

**Intercept** – Model intercept.

**RiskP** – Model estimate for ZP from event history models (see main text).

**RiskP2** – Model estimate for ZP2 from event history models (see main text).

**RiskL** – Model estimate for ZL from event history models (see main text).

**RiskL2** – Model estimate for ZL2 from event history models (see main text).

**Risk\_P1** – Predicted mortality risk for period 1.

Moatt et al Data S2B – Predictions for Survival Surface: Males Period 5

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**P** – Hypothetical protein intake.

**P2** – Hypothetical protein intake squared.

**L** – Hypothetical lipid intake.

**L2** – Hypothetical lipid intake squared.

**ZP –** P z transformed (mean of 0 and standard deviation of 1).

**ZP2 –** P2 z transformed (mean of 0 and standard deviation of 1).

**ZL –** L z transformed (mean of 0 and standard deviation of 1).

**ZL2 –** L2 z transformed (mean of 0 and standard deviation of 1).

**Intercept** – Model intercept.

**Risk\_5 –** Estimate for time period 5

**RiskP** – Model estimate for ZP from event history models (see main text).

**RiskP2** – Model estimate for ZP2 from event history models (see main text).

**RiskL** – Model estimate for ZL from event history models (see main text).

**RiskL2** – Model estimate for ZL2 from event history models (see main text).

**Risk\_P5** – Predicted mortality risk for period 5.

Moatt et al Data S3 – Predictions for Survival Surface: Females Period 1

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**P** – Hypothetical protein intake.

**L** – Hypothetical lipid intake.

**ZP –** P z transformed (mean of 0 and standard deviation of 1).

**ZL –** L z transformed (mean of 0 and standard deviation of 1).

**Intercept** – Model intercept.

**Protein\_Risk** – Model estimate for ZP from event history models (see main text).

**Lipid Risk** – Model estimate for ZL from event history models (see main text).

**Risk** – Predicted mortality risk.

Moatt et al Data S4 – Predictions for Survival Surface: Females Period 5

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**P** – Hypothetical protein intake.

**L** – Hypothetical lipid intake.

**ZP –** P z transformed (mean of 0 and standard deviation of 1).

**ZL –** L z transformed (mean of 0 and standard deviation of 1).

**Intercept** – Model intercept.

**P5** – Estimate for time period 5.

**Protein\_P5** – Model estimate for ZP period 5 from event history models (see main text).

**Lipid\_P5**– Model estimate for ZL period 5 from event history models (see main text).

**Risk** – Predicted mortality risk.

Moatt et al Data S5 – Courtship Data

**FID** – Unique ID for each individual.

**Family** – Unique code for family group (i.e. clutch of origin). Each clutch produced from a unique sire and dam.

**Shelf\_stack** – Unique code for the stack and shelf of fish home tank.

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Level** – Provisioning level, values represent percentages of monthly *ad libitum* monitoring.

**Size** – Size classification of individual (L = large, S = Small).

**Trial** – Number of trials that individual experienced.

**Days\_breeding** – Length of breeding season for that individual.

**P\_day –** Average protein intake per day during the breeding season (gday-1).

**P2\_day –** P\_day2 squared (i.e. daily protein intake squared).

**L\_day** - Average lipid intake per day during the breeding season (gday-1).

**L2\_day** – L\_day2 squared (i.e. daily lipid intake squared).

**Mean\_react** – Mean reaction time across all trials for that individual.

**Total\_ZZ** – Total number of zigzags across all trials.

**Total\_leads** – Total number of leads across all trials.

**Total\_court** – Total time courting across all trials.

Moatt et al Data S6 – Eggs Data

**FID** – Unique ID for each individual.

**Family** – Unique code for family group (i.e. clutch of origin). Each clutch produced from a unique sire and dam.

**Shelf\_stack** – Unique code for the stack and shelf of fish home tank.

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Level** – Provisioning level, values represent percentages of monthly *ad libitum* monitoring.

**Size** – Size classification of individual (L = large, S = Small).

**P\_day –** Average protein intake per day during the breeding season (gday-1).

**P2\_day –** P\_day2 squared (i.e. daily protein intake squared).

**L\_day** - Average lipid intake per day during the breeding season (gday-1).

**L2\_day** – L\_day2 squared (i.e. daily lipid intake squared).

**Days\_breeding** – Length of breeding season for that individual.

**Number\_clutches** – Number of clutches produced by that individual.

**Mean\_number** – Mean number of eggs per clutch.

**Total\_egg** – Total number of eggs produced.

Moatt et al Data S7 – Reproductive Sex Differences Data

**FID** – Unique ID for each individual.

**Family** – Unique code for family group (i.e. clutch of origin). Each clutch produced from a unique sire and dam.

**Shelf\_stack** – Unique code for the stack and shelf of fish home tank.

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Level** – Provisioning level, values represent percentages of monthly *ad libitum* monitoring.

**Size** – Size classification of individual (L = large, S = Small).

**ZP –** Daily protein intake z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**ZP2 –** Daily protein intake squared, z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**ZL –** Daily lipid intake z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**ZL2 –** Daily lipid intake squared, z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**Sex** – Sex for each individual (M = males, F = female).

**Total** – Z transformed (mean of 0 and standard deviation of 1) reproductive effort calculated independently for each sex. Male trait = time spent courting (s), Female trait = total eggs produced.

Moatt et al Data S8 – Territory Defence Data

**FID** – Unique ID for each individual.

**Family** – Unique code for family group (i.e. clutch of origin). Each clutch produced from a unique sire and dam.

**Shelf\_stack** – Unique code for the stack and shelf of fish home tank.

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Level** – Provisioning level, values represent percentages of monthly *ad libitum* monitoring.

**Size** – Size classification of individual (L = large, S = Small).

**Trial** – Number of trials that individual experienced.

**Days\_breeding** – Length of breeding season for that individual.

**P\_day –** Average protein intake per day during the breeding season (gday-1).

**P2\_day –** P\_day2 squared (i.e. daily protein intake squared).

**L\_day** - Average lipid intake per day during the breeding season (gday-1).

**L2\_day** – L\_day2 squared (i.e. daily lipid intake squared).

**Swims\_total** – Total number of aggressive swims across all trials.

**Mean\_react** – Mean reaction time across all trials for that individual.

**Orientated\_total** – Total time displaying aggression across all trials.

Moatt et al Data S9 – Nesting Data

**FID** – Unique ID for each individual.

**Family** – Unique code for family group (i.e. clutch of origin). Each clutch produced from a unique sire and dam.

**Stack\_shelf** – Unique code for the stack and shelf of fish home tank.

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Level** – Provisioning level, values represent percentages of monthly *ad libitum* monitoring.

**Size** – Size classification of individual (L = large, S = Small).

**Days\_nesting** – Length of nesting season for that individual.

**P\_day –** Average protein intake per day during the breeding season (gday-1).

**P2\_day –** P\_day2 squared (i.e. daily protein intake squared).

**L\_day** - Average lipid intake per day during the breeding season (gday-1).

**L2\_day** – L\_day2 squared (i.e. daily lipid intake squared).

**Num\_attempted –** Number of nests attempted.

**Num\_completed** – Number of nests completed.

Moatt et al Data S10 – Reproductive Senescence Data

**FID** – Unique ID for each individual.

**Family** – Unique code for family group (i.e. clutch of origin). Each clutch produced from a unique sire and dam.

**StackShelf** – Unique code for the stack and shelf of fish home tank.

**Sex** – Sex for each individual (M = males, F = female).

**Age** – Age at reproductive event.

**Age2** – Age squared.

**ZA** - Age z transformed (mean of 0 and standard deviation of 1), calculated independently for each.

**ZA2** – Age2, z transformed (mean of 0 and standard deviation of 1), calculated independently for each.

**Age\_first** – Age of first reproductive event.

**F2** – Age\_first suqared.

**ZF** – Age\_first z transformed (mean of 0 and standard deviation of 1), calculated independently for each.

**ZF2** – F2, z transformed (mean of 0 and standard deviation of 1), calculated independently for each.

**Age\_last** – Age of last reproductive event.

**La2** – Age\_last suqared.

**ZLa** – Age\_last z transformed (mean of 0 and standard deviation of 1), calculated independently for each.

**ZLa2** – La2, z transformed (mean of 0 and standard deviation of 1), calculated independently for each.

**P –** Average protein intake per day during the breeding season (gday-1).

**P2 –** P\_day2 squared (i.e. daily protein intake squared).

**ZP –** Daily protein intake z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**ZP2 –** Daily protein intake squared, z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**L** - Average lipid intake per day during the breeding season (gday-1).

**L2** – L\_day2 squared (i.e. daily lipid intake squared).

**ZL –** Daily lipid intake z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**ZL2 –** Daily lipid intake squared, z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**Trait** - Z transformed (mean of 0 and standard deviation of 1) reproductive effort calculated independently for each sex. Male trait = time spent courting (s), Female trait = total eggs produced.

**Trait\_value –** Actual value for reproductive trait. Male trait = time spent courting (s), Female trait = total eggs produced.

Moatt et al Data S11 – Predictions for Plot of the Effect of Age of First Reproduction on Senescence

**First –** Hypothetical age of first reproduction

**Age** – Hypothetical age at reproduction.

**Age2** – Age squared.

**ZF** – Age\_first z transformed (mean of 0 and standard deviation of 1). Taken from Data S10 for that age.

**ZA** - Age z transformed (mean of 0 and standard deviation of 1). Taken from Data S10 for that age.

**ZA2** – Age2, z transformed (mean of 0 and standard deviation of 1). Taken from Data S10 for that age.

**Intercept** – Model intercept.

**A** – Model estimate for the effect of age.

**A2** – Model estimate for the effect of age2.

**F**– Model estimate for the effect of age of first reproduction.

**AgeFirst**– Model estimate for the interaction between age and age of first reproduction.

**Prediction** – Predicted reproductive effort.

Moatt et al Data S12 – Predictions for Plot of the Effect of Age of Last Reproduction on Senescence

**Last –** Hypothetical age of last reproduction

**Age** – Hypothetical age at reproduction.

**Age2** – Age squared.

**ZA** - Age z transformed (mean of 0 and standard deviation of 1). Taken from Data S10 for that age.

**ZA2** – Age2, z transformed (mean of 0 and standard deviation of 1). Taken from Data S10 for that age.

**ZLa** – Age of last reproduction z transformed (mean of 0 and standard deviation of 1). Taken from Data S10 for that age.

**Intercept** – Model intercept.

**A** – Model estimate for the effect of age.

**A2** – Model estimate for the effect of age2.

**Last**– Model estimate for the effect of age of last reproduction.

**AgeLast**– Model estimate for the effect of the interaction between age and age of last reproduction.

**Prediction** – Predicted reproductive effort.

Moatt et al Data S13 – Prediction for Sex Specific Patterns of Reproductive Senescence

**Sex –** Hypothetical sex of individual (m = male, f = female)

**Age** – Hypothetical age at reproduction.

**Age2** – Age squared.

**ZA** - Age z transformed (mean of 0 and standard deviation of 1). Taken from Data S10 for that age.

**ZA2** – Age2, z transformed (mean of 0 and standard deviation of 1). Taken from Data S10 for that age.

**Intercept** – Model intercept.

**ESex** – Model estimate for the effect of sex (females were the reference level so the estimate is 0).

**A** – Model estimate for the effect of age in females.

**A2** – Model estimate for the effect of age2 in females.

**AM** – Model estimate for the effect of age in males.

**A2M** – Model estimate for the effect of age2 in males.

**Prediction** – Predicted reproductive effort.

Moatt et al Data S14 – Nuptial Colour Data

**FID** – Unique ID for each individual.

**Family** – Unique code for family group (i.e. clutch of origin). Each clutch produced from a unique sire and dam.

**StackShelf** – Unique code for the stack and shelf of fish home tank.

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Level** – Provisioning level, values represent percentages of monthly *ad libitum* monitoring.

**Size** – Size classification of individual (L = large, S = Small).

**Age** – Age of first measure.

**Age2** – Age squared.

**Last** – Age of last measure.

**Last2** – Age\_last suqared.

**P\_day –** Average protein intake per day during the breeding season (gday-1).

**P2\_day –** P\_day2 squared (i.e. daily protein intake squared).

**L\_day** - Average lipid intake per day during the breeding season (gday-1).

**L2\_day** – L\_day2 squared (i.e. daily lipid intake squared).

**Red\_intensity** – Intensity of red colour displayed.

Moatt et al Data S15 – Length, Weight and Condition Index Data

**FID** – Unique ID for each individual.

**StackShelf** – Unique code for the stack and shelf of fish home tank.

**Sex** – Sex of individual (M = male, F = female).

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Level** – Provisioning level, values represent percentages of monthly *ad libitum* monitoring.

**Size** – Size classification of individual (L = large, S = Small).

**Batch** – Weighing batch. NB Batch 1 is prior to diet treatments therefore has no corresponding values for protein and lipid intake.

**P\_day –** Average protein intake per day during the breeding season (gday-1).

**P2\_day –** P\_day2 squared (i.e. daily protein intake squared).

**L\_day** - Average lipid intake per day during the breeding season (gday-1).

**L2\_day** – L\_day2 squared (i.e. daily lipid intake squared).

**ZP –** Daily protein intake z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**ZP2 –** Daily protein intake squared, z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**ZL –** Daily lipid intake z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**ZL2 –** Daily lipid intake squared, z transformed (mean of 0 and standard deviation of 1), calculated for each sex independently.

**Ln** – Length of individual in mm.

**Wt** – Weight of individual in g.

**CI** – Condition Index for each individual.

Moatt et al Data S16 – Intake Data

**Feeding\_period** – Feeding period.

**Date\_start** – Start date of feeding period.

**Date\_end –** End date of feeding period.

**Days –** Length of feeding period (days).

**Sex** – Sex of individual (M = male, F = female).

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Size** – Size classification of individual (L = large, S = Small).

**Fish** – Sentinel fish measured (NB, not the same fish across feeding periods).

**Intake\_fish** – Intake for that sentinel fish in gday-1

Moatt et al Data S17 – Lifespan Data for Fig.S1

**FID** – Unique ID for each individual.

**Sex** – Sex of individual (M = male, F = female).

**Diet** – Diet Treatment (Diet P:L: 1 = 10.2:1, 2 = 4.6:1, 3 = 2.5:1, 4 = 8.5:1, 5 = 1.6:1).

**Level** – Provisioning level, values represent percentages of monthly *ad libitum* monitoring.

**Size** – Size classification of individual (L = large, S = Small).

**Lifespan** – Lifespan of individual (weeks).

**Status –** Survival status of individual at end of experiment (0 = alive, 1 = dead).