

Effects of Prenatal Diet Gel on breeding

performance in 3 different transgenic mice with breeding difficulties

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Abstract

Mouse breeding performance can vary according to strain and dietary needs. The veterinary care staff at the Animal Resources Division of the Research Institute of the McGill University Health Center (RI-MUHC) wanted to find an easy-to-use dietary supplement that could help mouse strains with breeding difficulties. Clear H2O prenatal gel diet had just come out on the market, however no data was available that assessed its benefits. In this study, we compared the frequency of litters, litter size, and weaning body weight when various mouse strains on various backgrounds (YFP-SCID, NOD-SCID-Gamma, ACB4 recombinant congenic), were supplemented with prenatal diet gel with our standard husbandry practice (rodent diet teklad 2918X or 2920X) for a period of 6 months per strain. We observed a significant increase in litter size in one strain, and an increased trend in frequency of litters for all strains. In addition, we calculated a breeder score which included all 3 components observed (the litters in 6 months, average pup BW and litter size), and observed that the prenatal diet scored better than the 2918X diet, but not the 2920X diet. In the course of the study, we also optimized the quantity of diet gel to give per breeding cage. In conclusion, we have started recommending prenatal gel diet for strains with breeding difficulties.

Methodology

2018

2020X

Clear H₂O

Teklad Global 18% Protein Rodent

Teklad Global Soy Protein-Free Extruded

DietGel[®] Prenatal

Product Description- 2018 is a fixed formula, non-autoclavable diet manufactured with high quality ingredients and designed to support gestation, lactation, and growth of rodents. 2018 does not contain alfalfa, thus lowering the occurrence of natural phytoestrogens. Typical isoflavone concentrations (daidzein + genistein aglycone equivalents) range from 150 to 250 mg/kg. Exclusion of alfalfa reduces chlorophyll, improving optical imaging clarity. Absence of animal protein and fish meal minimizes the presence of nitrosamines. Also available certified (2018C) and irradiated (2018I). For autoclavable diet, refer to 2018S (Sterilizable) or 2018SX (Extruded & Sterilizable).

Product Description- 2020X is a fixed formula, non-autoclavable extruded diet manufactured with high quality ingredients and designed to support gestation, lactation, and growth of rodents. 2020X does not contain alfalfa or soybean meal, thus minimizing the occurrence of natural phytoestrogens. Typical isoflavone concentrations (daidzein + genistein aglycone equivalents) range from non-detectable to 20 mg/kg. Exclusion of alfalfa reduces chlorophyll, improving optical imaging clarity. Absence of animal protein and fish meal minimizes the presence of nitrosamines. Also available certified (2020XC) and irradiated (2020XI). For autoclavable diet, refer to 2020XS (Sterilizable).

Macronutrients		Macronutrients	
Crude Protein	%	18.6	19.1
Fat (ether extract)	%	6.2	6.5
Carbohydrate (available)	%	44.2	47.0
Crude Fiber	%	3.5	2.7
Neutral Detergent Fiber	%	14.7	12.3
Ash	%	5.3	5.1
Energy Density	kcal/g (kJ/g)	3.1 (13.0)	3.1 (13.0)
Calories from Protein	%	24	24
Calories from Fat	%	16	16
Calories from Carbohydrate	%	58	60

Macronutrients		Macronutrients	
Crude Protein	%	19.1	19.1
Fat (ether extract)	%	6.5	6.5
Carbohydrate (available)	%	47.0	47.0
Crude Fiber	%	2.7	2.7
Neutral Detergent Fiber	%	12.3	12.3
Ash	%	5.1	5.1
Energy Density	kcal/g (kJ/g)	3.1 (13.0)	3.1 (13.0)
Calories from Protein	%	24	24
Calories from Fat	%	16	16
Calories from Carbohydrate	%	60	60

Nutritional Information per 100g

Calories	268.9 kcal
Protein	14.3 g
Carbohydrates (total)	18.2 g
Sugars (total)	15.1 g
Dietary Fiber	2.0 g
Fat (total)	15.2 g
Saturated Fat	3.5 g
Omega 3 Fatty Acids	2.2 g
Moisture	48 %
Sodium	156.0 mg
Potassium	460.1 mg
Calcium	280.6 mg
Phosphorus	332.5 mg
Iron	2.0 mg

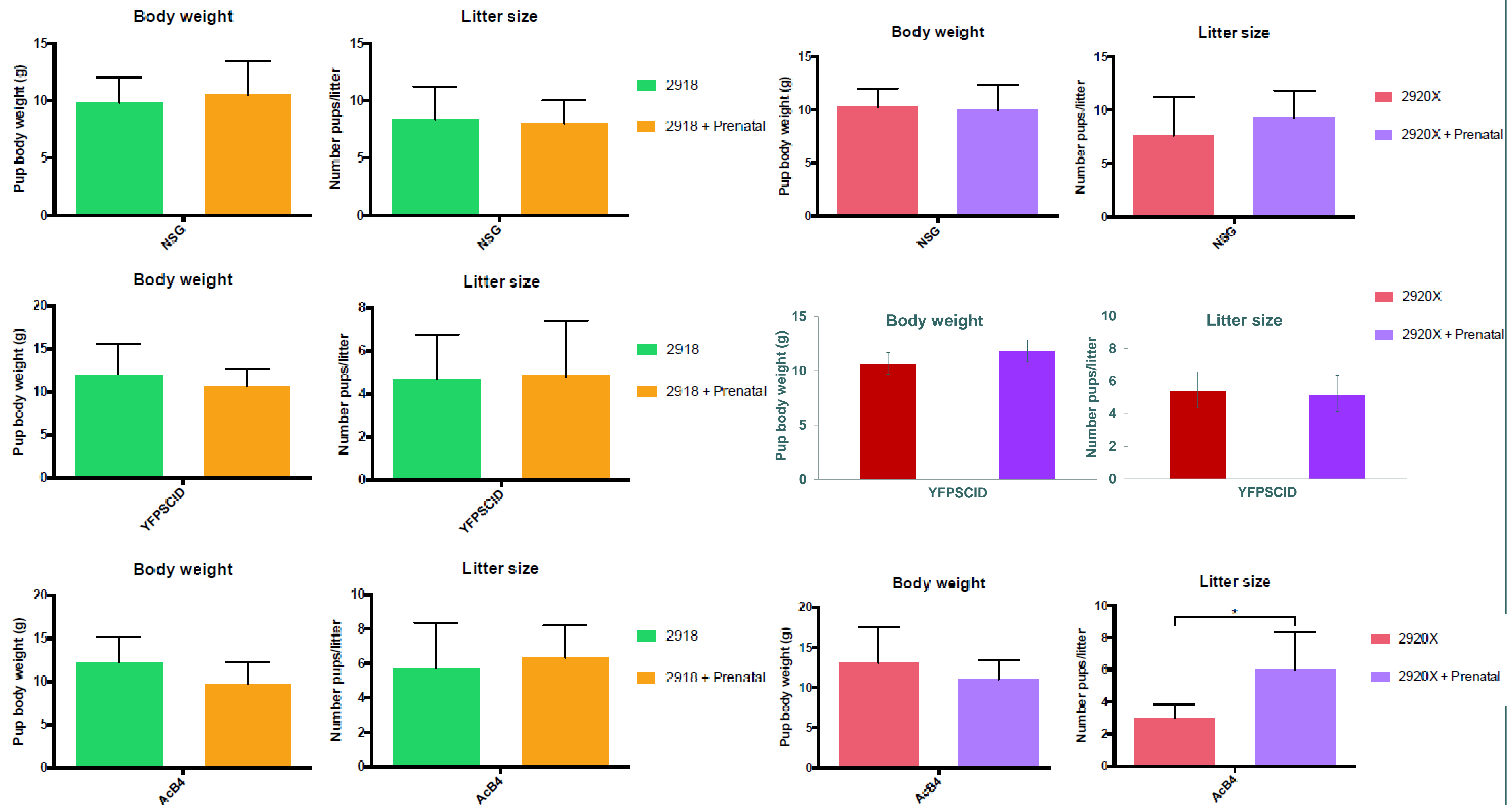
Research animals at the RI-MUHC are commonly fed teklad's rodent diets 2918 (irradiated, non-extruded) and 2920X (irradiated, extruded). Both of these diets are designed to support gestation and lactation of rodents. However, some transgenic mice strain have breeding difficulties, and supplemental foods (transgenic dough, love mash, sunflower seeds) can, in some situations, be beneficial for them.

Here, we observed 3 transgenic lines (2-4 breeding cages) with or without Clear H2O's prenatal diet gel. For the groups that received the diet gel, a quarter cup was placed in the cage as soon as the first pregnancy was observed, and changed every 3 days for 6 continuous months.



Originally we would put the whole cup in the cage but some mice would scatter the diet gel everywhere. We then started to place only a quarter of the cup. Some mice new to the diet gel will hide it under the bedding.

Results



Discussion and Acknowledgments



Points Awarded	# litters in 6 months	Average pup BW	# pups per litter
1	≤ 2.0	≤ 9.5	≤ 5.0
2	2.1 - 3.5	9.6 - 13	5.1 - 8.5
3	≥ 3.6	≥ 13.1	≥ 8.6

The number of litters per female, the number of pups per litter and the weight of pups at weaning were measured. Litter size was significantly increased in the ACB4 strain with prenatal diet, compared to the 2920X diet.

In addition, when strains were combined, breeder quality was calculated across the different diets. 2920X+prenatal diet had the highest breeder quality.

It was observed that females seem to be eating the prenatal diet more during gestation than right before labor. Pups did not seem interested in eating the diet gel.

As there are whole seeds in the prenatal diet, it may be viewed as an enrichment, as some mice would pick out only the seeds.

To note: this study was done with an older formula of diet gel prenatal. From observation, mice seem to eat even more the new formula.

In the future, we would like to test the prenatal diet on strains that are prone to dystocias to see if this would possibly be lower the incidence of dystocias.

We would like to thank ClearH2O and all the AHTs from the RI-MUHC for their help in this project!

ClearH₂O

