

# Burrito Analysis

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# Research Question

- ▶ The question that we are investigating is how do ingredients effect cost.
- ▶ We run two models one looking at meat ingredients and one with top 10 other ingredients.
- ▶ Location is used as a random effect.

## Data processing

- ▶ To prepare the data, we made two data sets. One data set looked at the meat ingredients (Beef, Pork, Chicken, Shrimp, Fish) and the top 10 other ingredients used (Pico, Guac, Cheese, Fries, Sour cream, Rice, Beans, Sauce, Cilantro, Onion)
- ▶ We removed two observations because they were not complete.

# Model



$$Y_{ij}|\alpha, \beta, \gamma_j, \sigma^{-2} \sim N(\alpha + X_{ij}^T \beta + \gamma_j, \sigma^2)$$

$$\alpha \sim Flat$$

$$\beta \sim N(0, \tau^2 I)$$

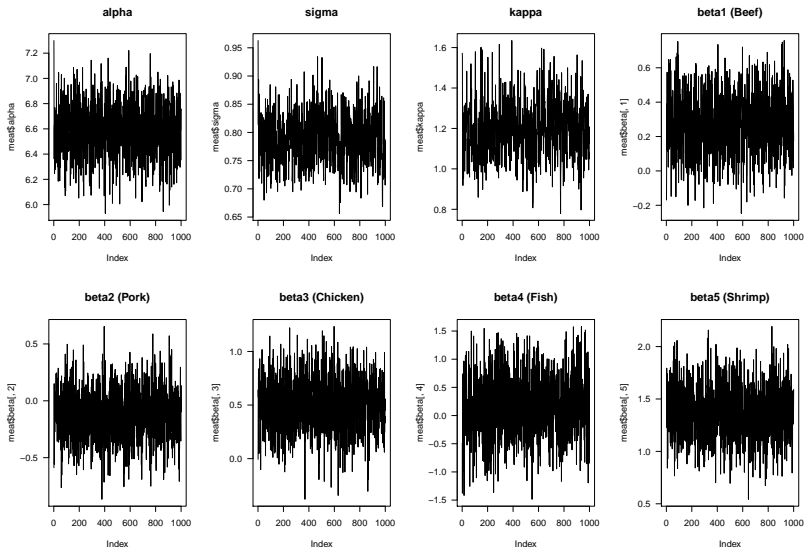
$$\gamma_j|\kappa^{-2} \sim N(0, \kappa^2)$$

$$\sigma^{-2} \sim Gamma(a_1, a_2)$$

$$\kappa^{-2} \sim Gamma(b_1, b_2)$$

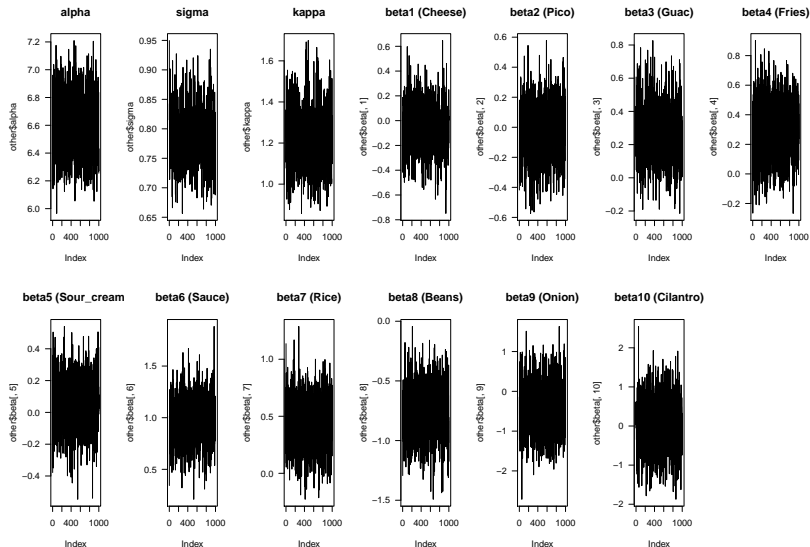
- ▶ We used a Block Gibbs sampler to estimate the values.

# Diagnostics for meat model



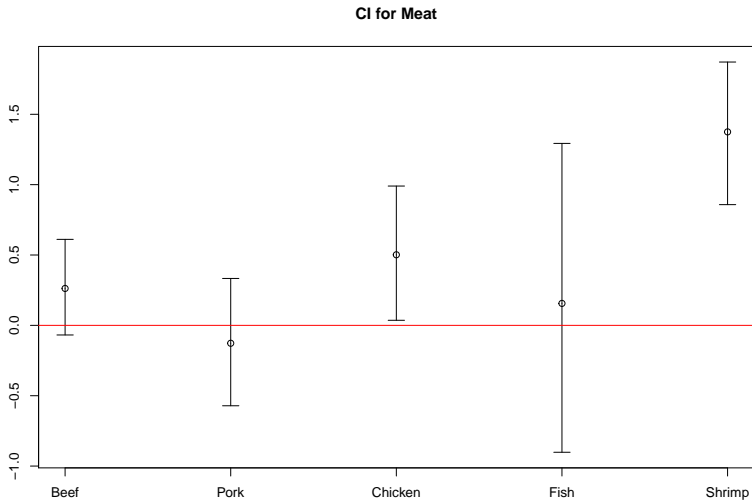
► Convergence looks good.

# Diagnostics for other ingredients model



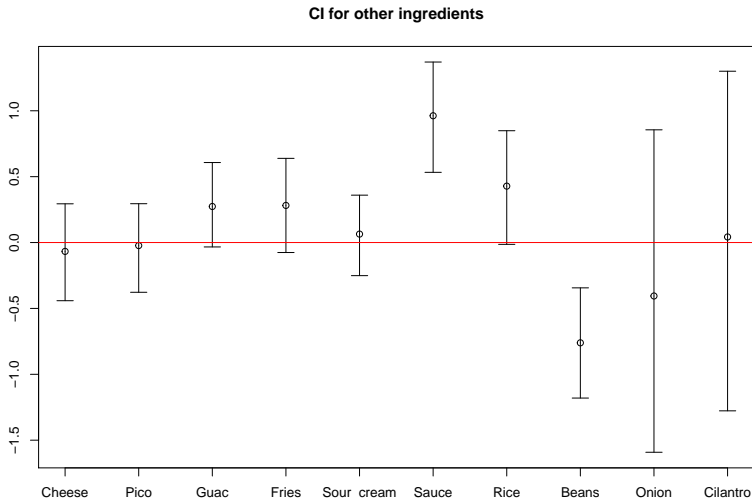
► Convergence looks good.

# Results



- Shrimp is significant for a higher price.

## Results cont.



- ▶ Sauce is significant for a higher price.
- ▶ Beans are significant for a lower price.



## Conclusions

- ▶ We can see from the  $\beta_i$  estimates that Shrimp and Sauce have an positive effect on price and Beans have a negative effect.

```
table(apply(meat$gamma,1,which.max))/1000
```

```
##  
##      7      47      50      59  
## 0.004 0.990 0.005 0.001
```

```
locations[47]
```

```
## [1] "Humbertos"
```

- ▶ The most expensive location is by far Humbertos.

## Conclusions cont.

- We can also look and see which restaurants are the “cheapest”.

```
table(apply(meat$gamma,1,which.min))/1000
```

```
##
```

```
##      1      2     11     15     16     18     22     23     24
```

```
## 0.013 0.056 0.001 0.044 0.047 0.051 0.002 0.008 0.010 0.
```

```
##     28     32     41     42     44     45     46     51     58
```

```
## 0.002 0.001 0.665 0.005 0.015 0.001 0.001 0.020 0.015 0.
```

## Conclusions cont.

```
locations[c(41,2,15)]
```

```
## [1] "Pokirrito"           "Oscar's Mexican food"  
## [3] "Raul's Mexican food"
```

- Overall the locations that have the lowest price are Pokirrito, Oscar's Mexican Food, and Raul's Mexican food.