- I’m Deech Madhavan, a Rocket Scientist educated at Georgia Tech, applying that knowledge, together with my colleagues here at Mtech Systems, to the challenge of more efficiently, humanely and sustainably feeding the world.

We at Mtech are super-excited to share with you a glimpse into the innovative journey we have been on for close to 30 years, but which has truly “blasted off” in the last few years as we have applied new technology and strategies to solving many of the age old problems affecting the Protein production industry

I am joined today by another Georgia Tech alum, Evan Sadlon, our lead Data Scientist at Mtech. We will discuss our approach to applying AI to production analysis, and more importantly, take a look at what is already being put to work in some of the industries top producers.

Feature Importance

- By now we assume everyone accepts what our scientist are telling us….and no I am not talking about global warming or covid19.....

I am referring to the fact that big data, combined with artificial intelligence can uncover the hidden influencers in poultry production and lead us all to the practices and processes to achieve our goals of feeding the growing world population, without harming the environment and treating the animals we rely on for survival the best we can.

Feature Importance

- As MTech and many others in our industry have been theorizing for years the impact AI can have on our efforts, we have learned through much trial and error that too narrow of a focus can lead us to incorrect assumptions/decisions?

- So today we will talk with Evan about our approach, called Feature Importance, that deviates from an initial laser focus on improving a single input, like perhaps nutrition, and instead leverages the volumes of production data we aggregate in our industry supply-chain solution to let the broad collection of variables tell us first what to look for. What factors in each integration are affecting that specific supply-chain performance, as surely it is not the same for everyone.

Feature Importance

- Evan, can you briefly describe for us what exactly “Feature Importance” is based on and how we approach it.

- (Evan explains high level)

- Interesting approach, can you share some example and maybe some results on how Mtech is applying Feature Importance to solve some of the industries problems?

Condemnation Consulting

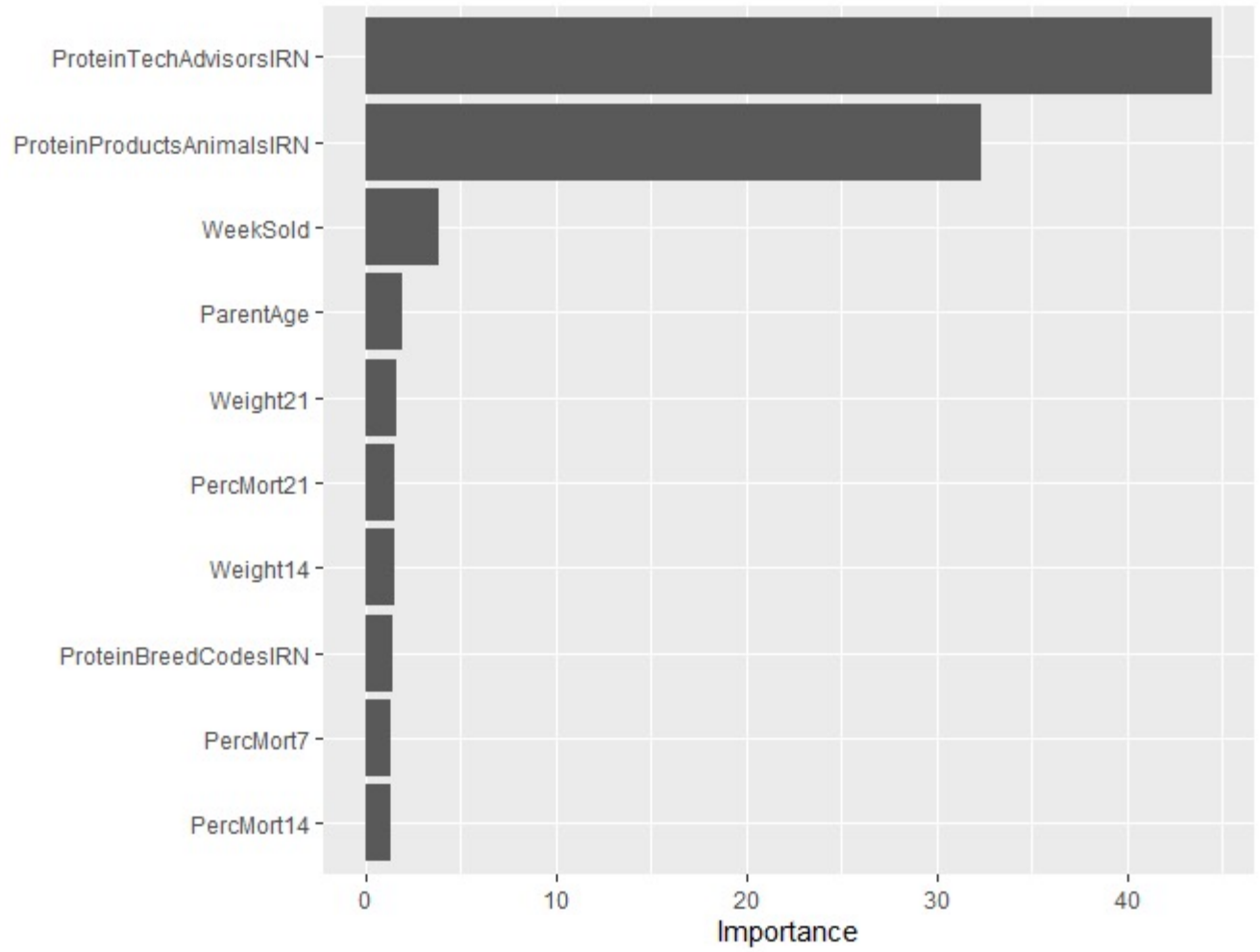
- We were tasked by a company to help predict and mitigate condemnation
- Using an ensemble of supervised learning classification models, we were able to build a model with over 80% accuracy, and found the source of the problem

Feature Importance

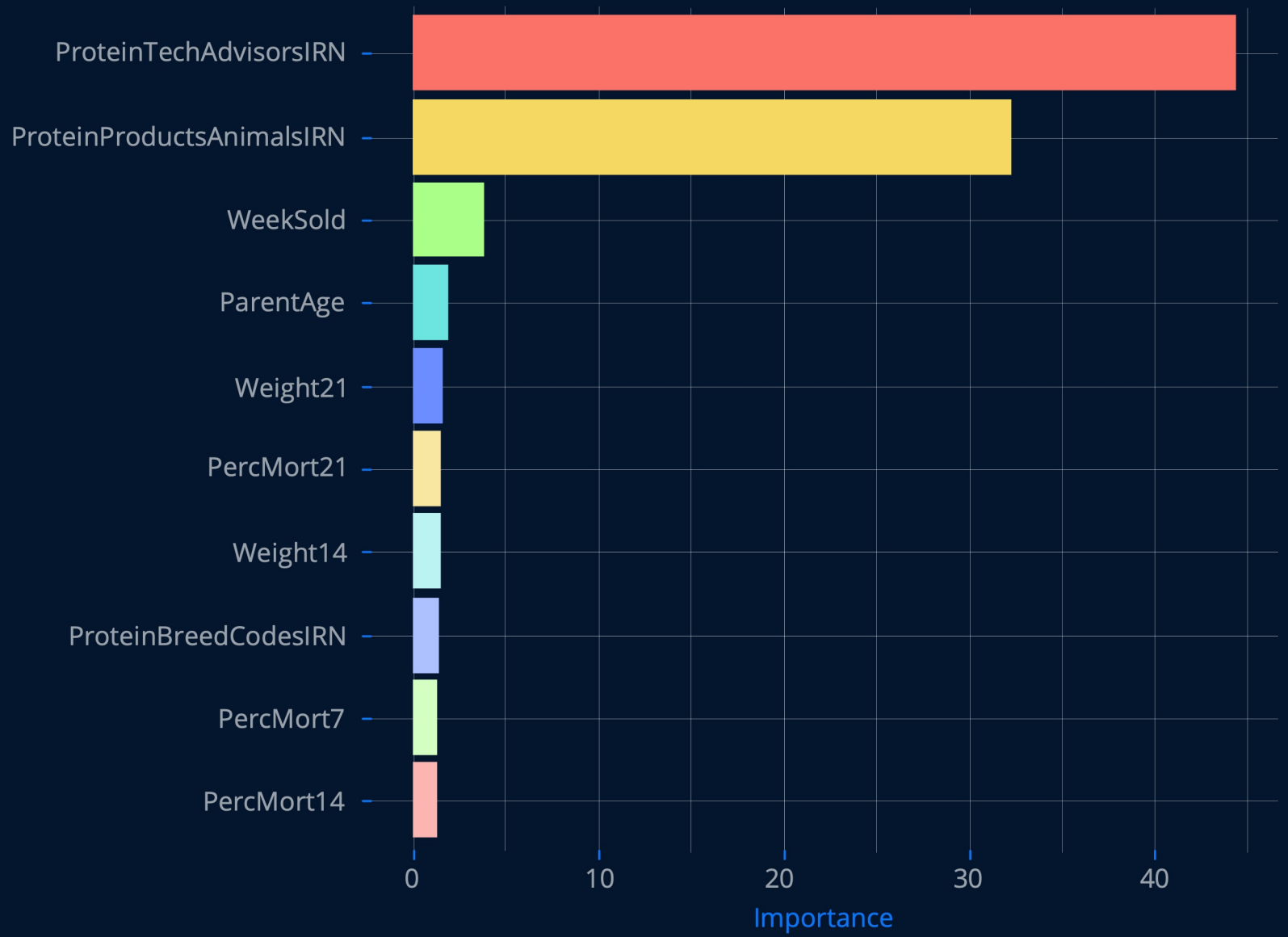
Subset of the columns we gave the models and how the models ranked each one in terms of importance.

It does this by varying the original input for each, and seeing how inaccurate the new outcome is.

This ranking serves as a starting point for what to investigate



Feature Importance

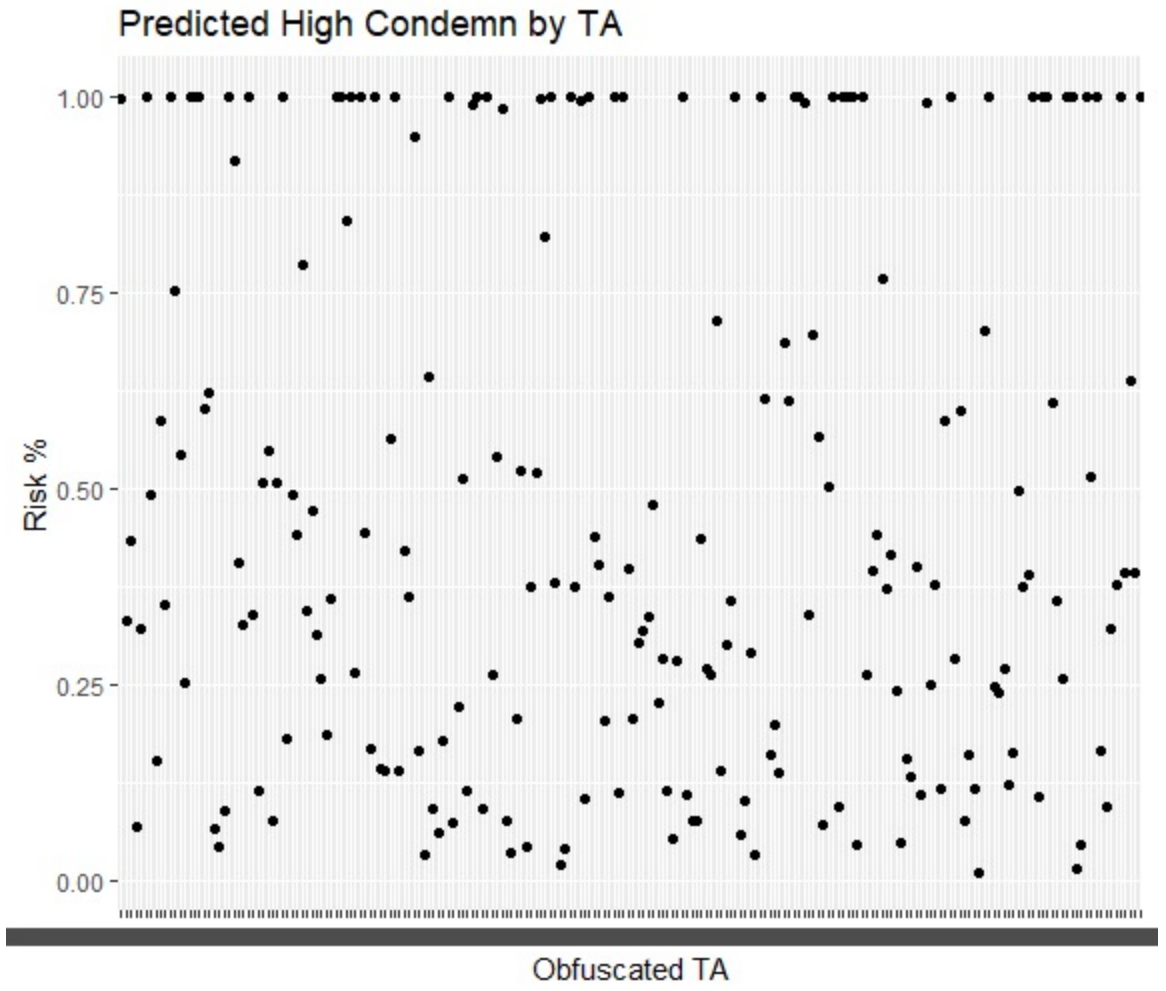


Feature Dependency

If we were to clone every TA, go back in time and let the clones take turns watching over every flock, this is what the model thinks is the outcome.

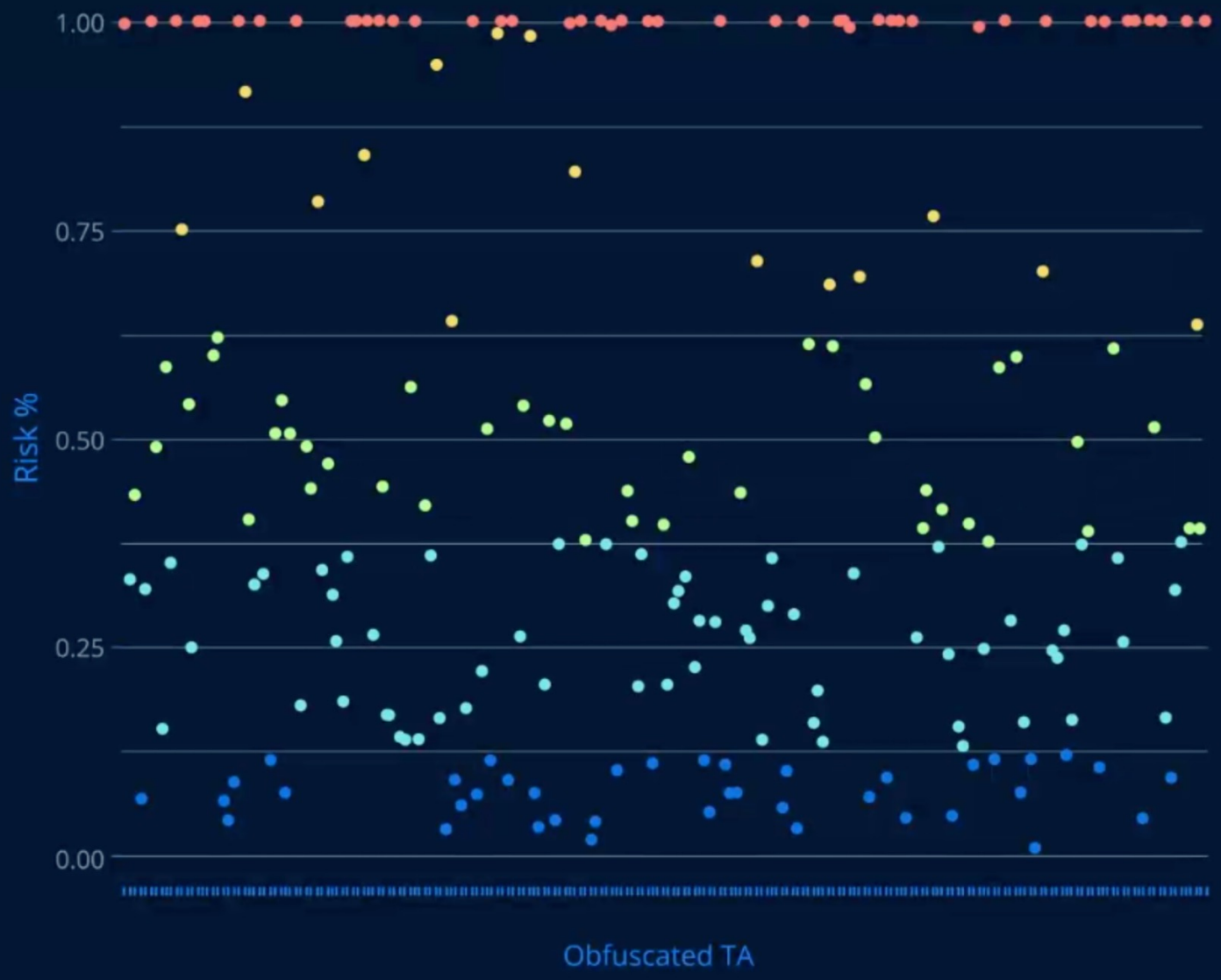
Each dot is a TA, the higher they are, the more flocks had significant condemnation

The row at 100% is suspicious



Feature Dependency

Predicted High Condemn by TA

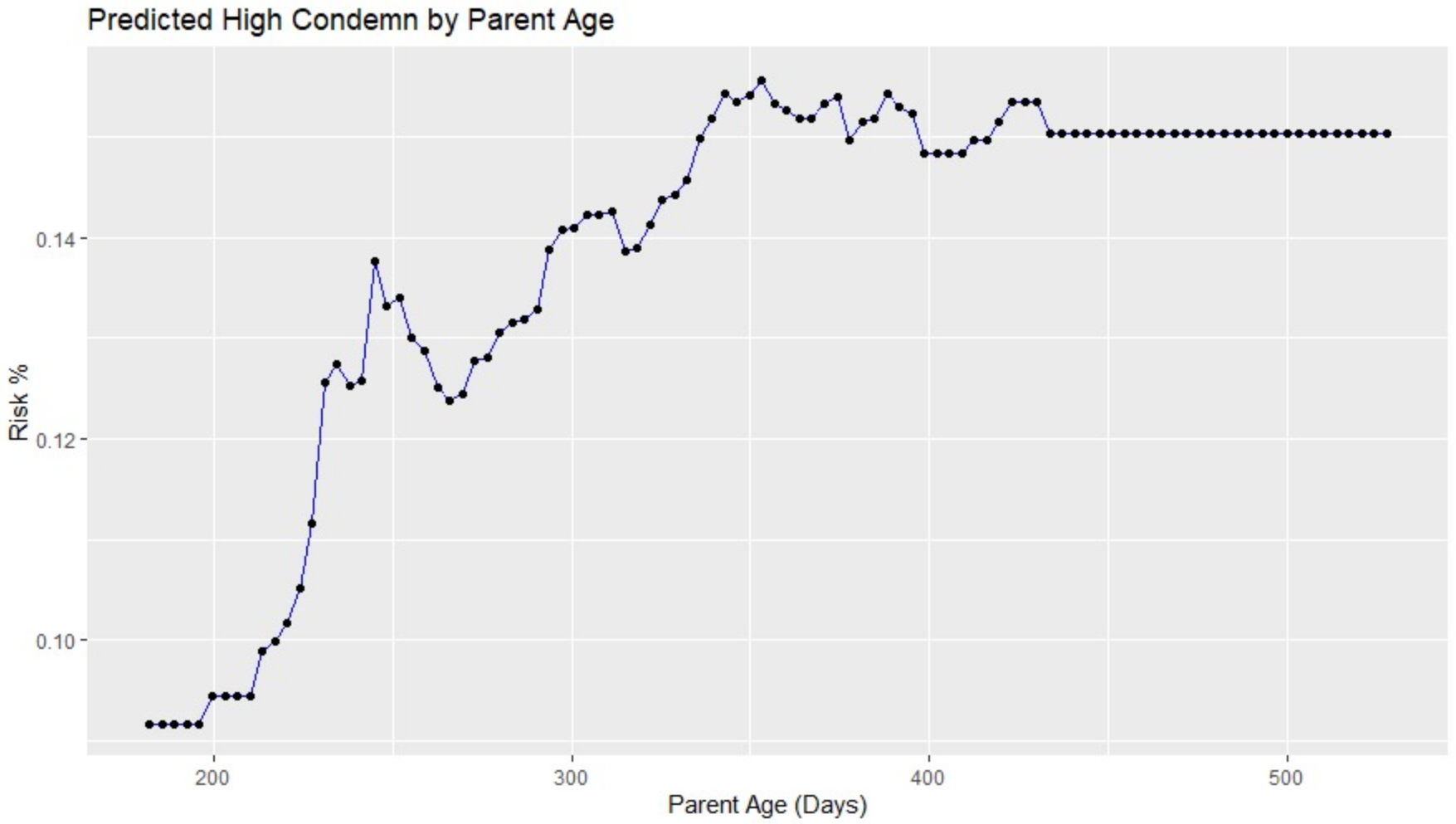


Feature Dependency

If we were to go back in time and supply every broiler flock with these specific parent ages, this is what the model thinks is the outcome.

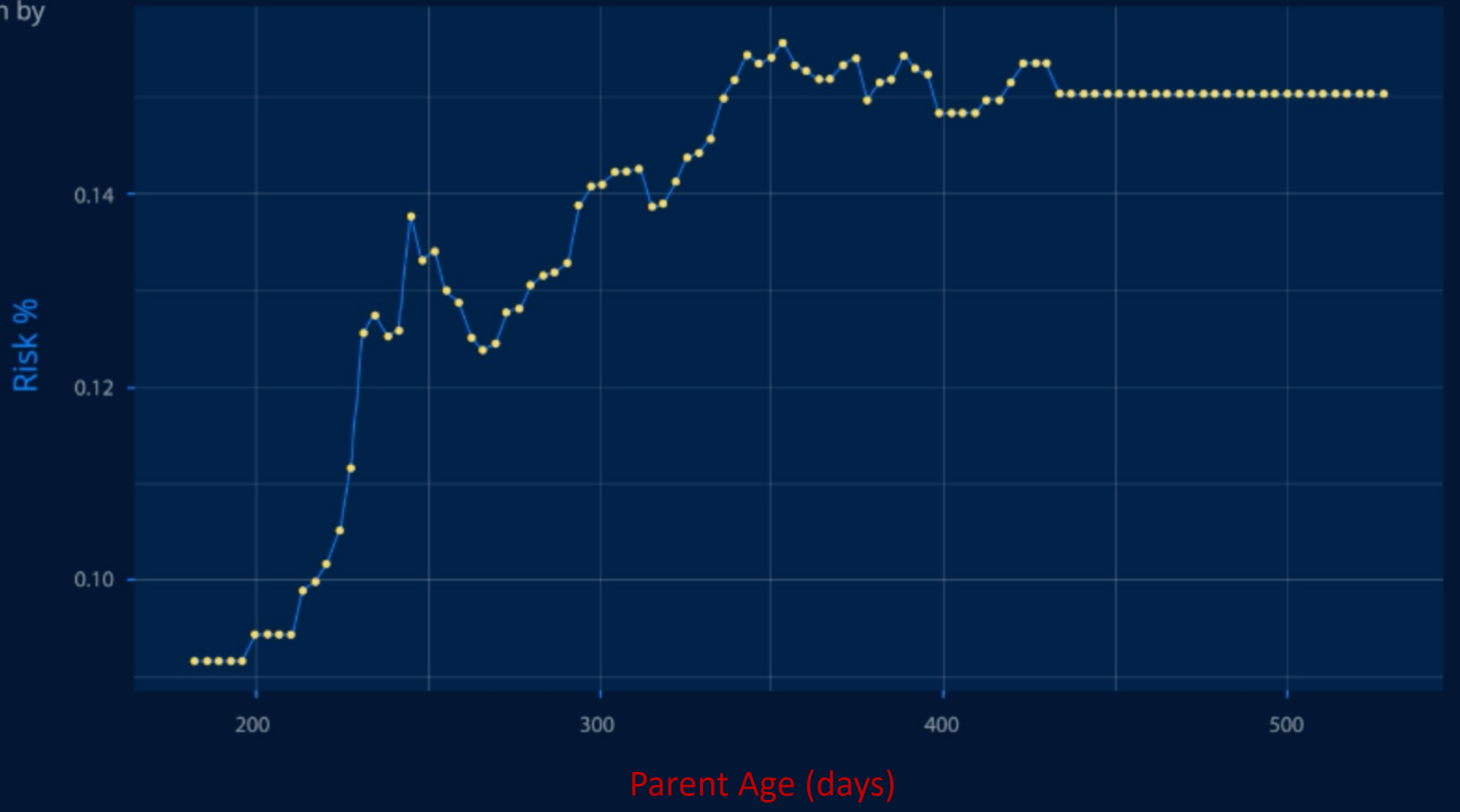
Something counterintuitive shows here. Prime parent ages are performing worse than parents too young.

Either something is wrong with the model, the entirety of poultry knowledge is wrong, or there is a confounding variable. (Hint, it's #3)



Feature Dependency

Predicted High Condemn by Paren Age

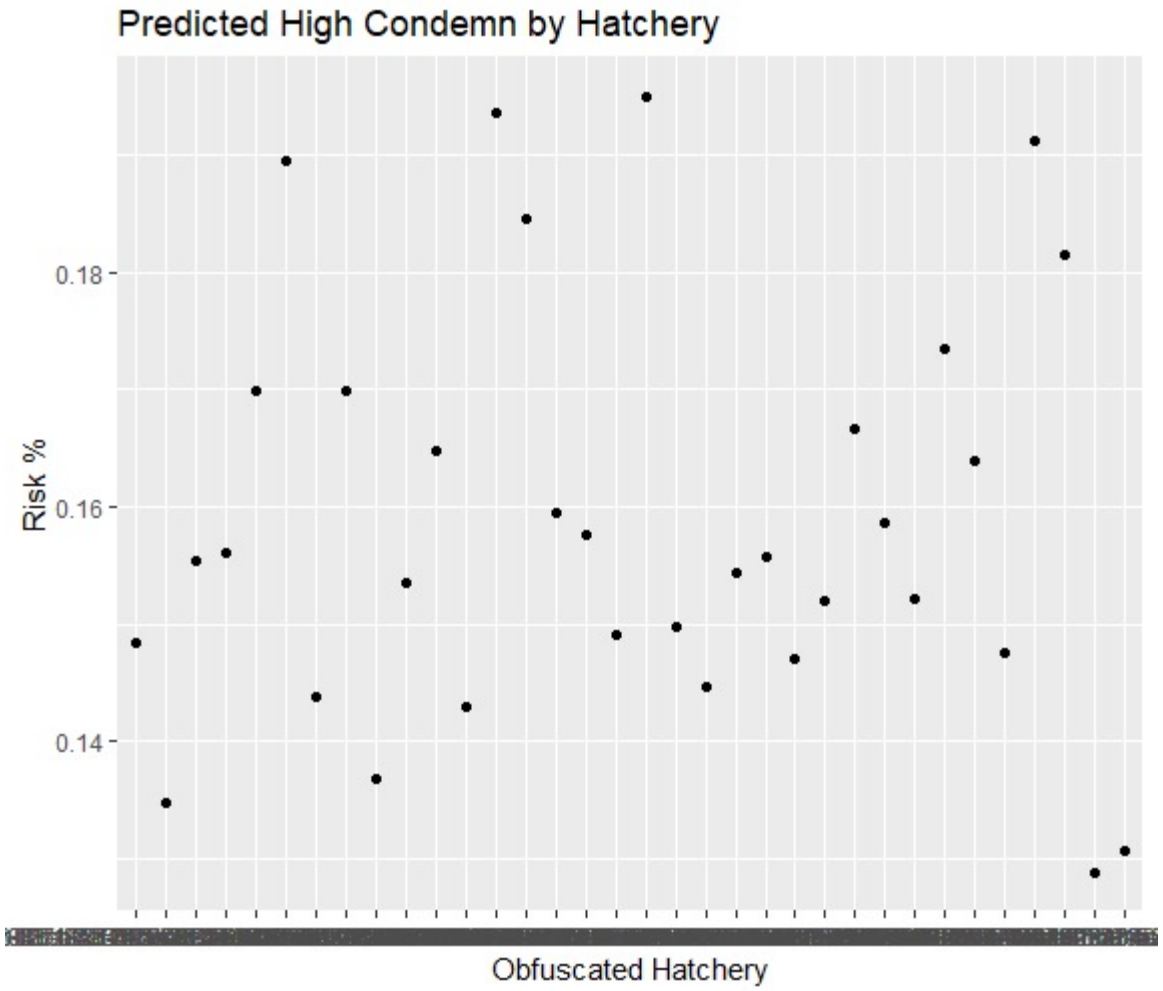


Feature Dependency

If we were to go back in time and supply every broiler flock from these specific hatcheries, this is what the model thinks is the outcome.

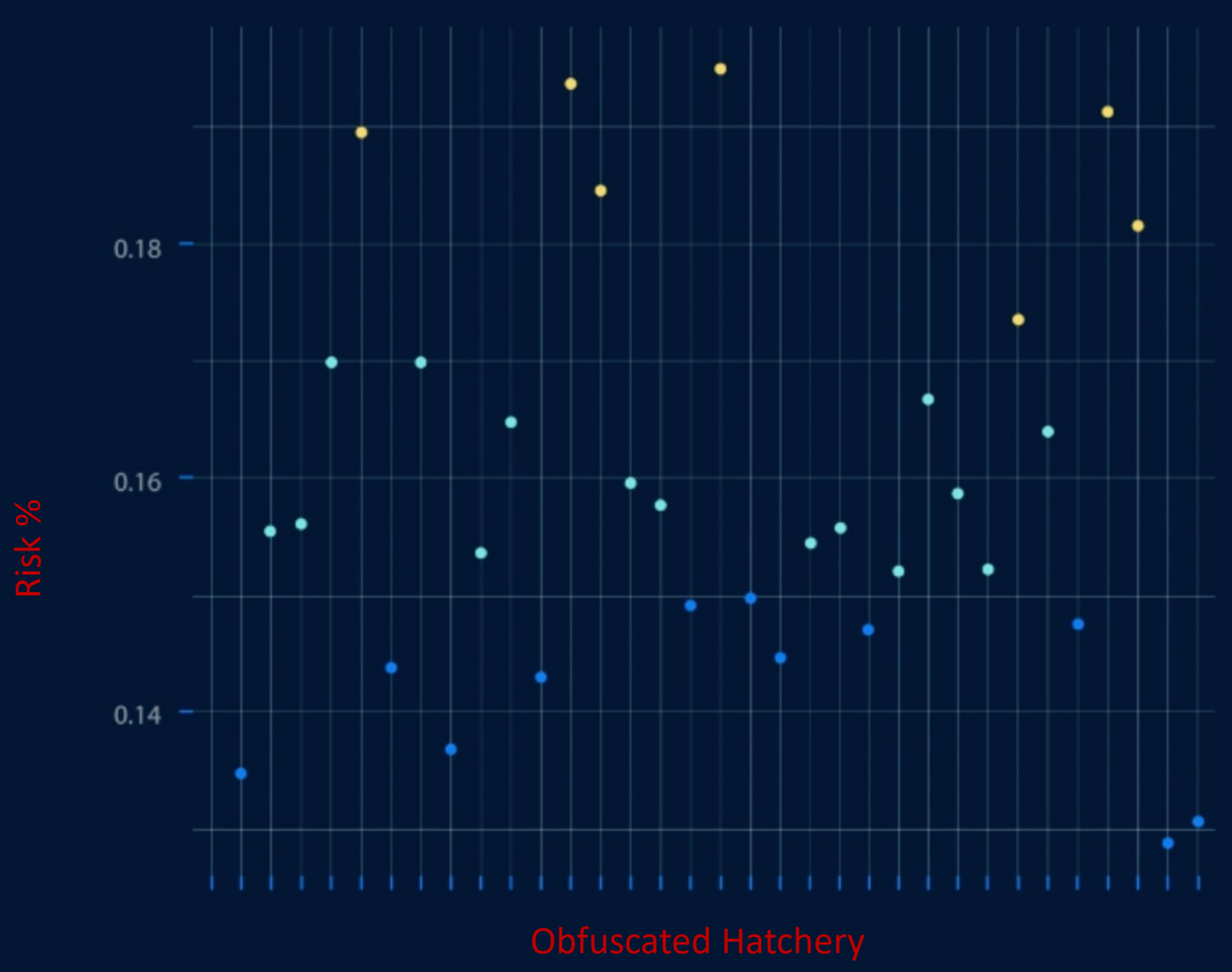
There are some low and middling values, but there are 4-5 hatcheries that the model predicts if all broilers were sourced from there, things would go wrong.

From here we coupled this hatchery to parent ages and TAs. It turns out these hatcheries had the most prime parent ages, and were sourcing those “bad” TAs. Further investigation/data requests and we found that specific hatchers/setters were cooking too long for too hot.



Feature Dependency

Predicted High Condemn by Hatchery



Optimization Consulting

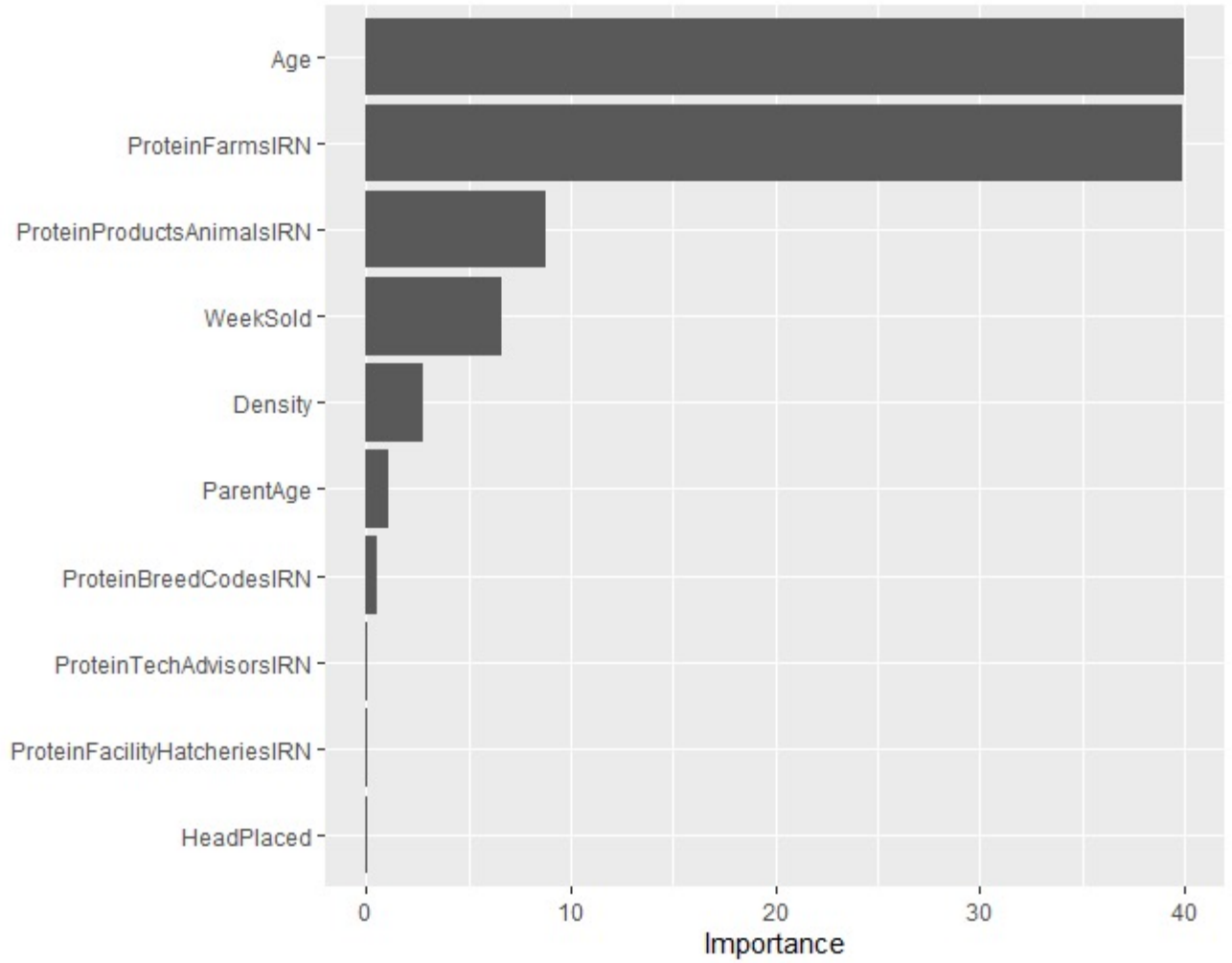
- If things are working as intended, we can use similar techniques as above to make operational choices.
- Using an ensemble of supervised learning regression models, we can build models to predict essentially anything. For this purpose, we chose bird weight.

Feature Importance

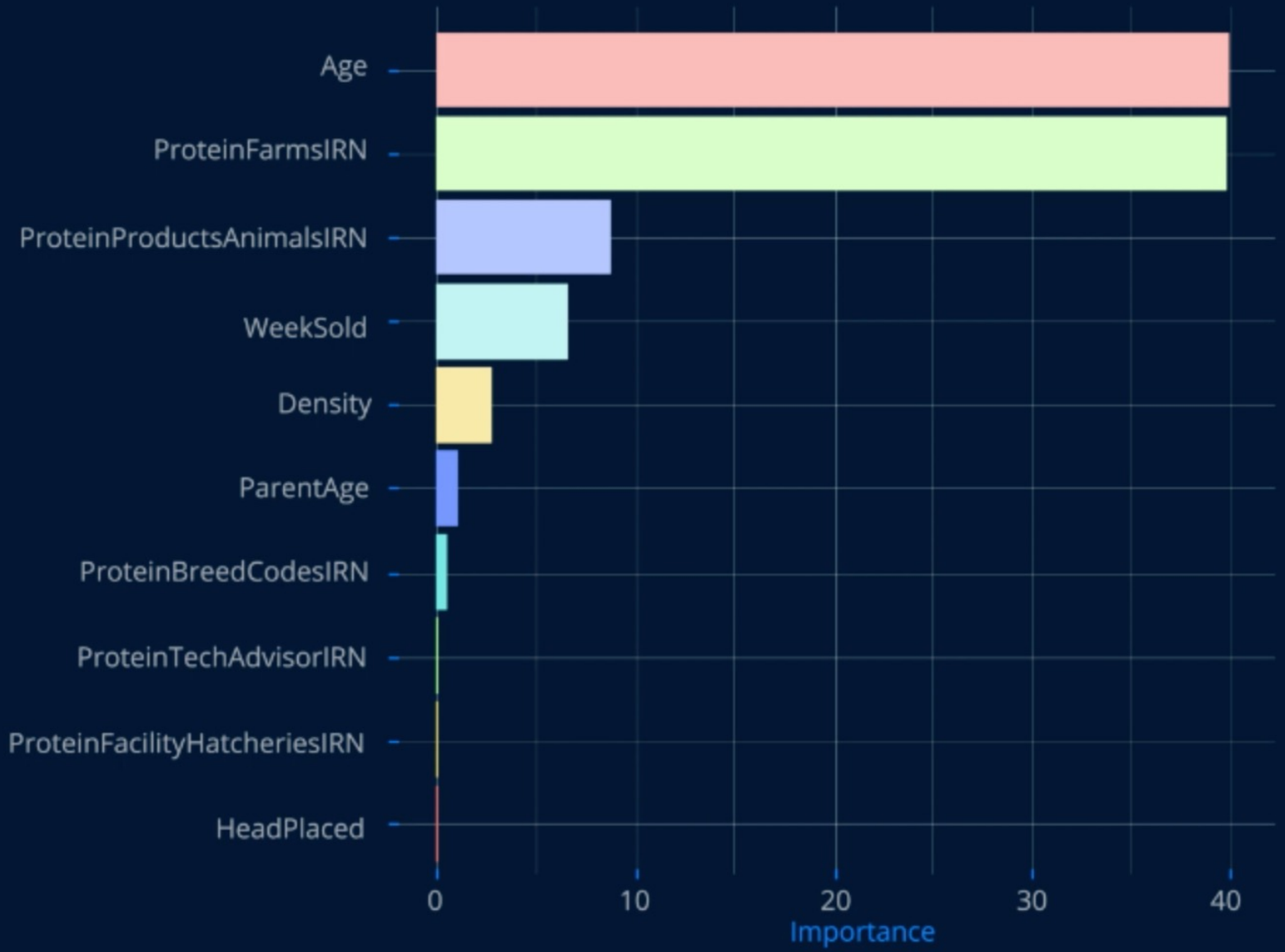
Subset of the columns we gave the models and how the models ranked each one in terms of importance.

It does this by varying the original input for each, and seeing how inaccurate the new outcome is.

This ranking serves as a starting point for what to change

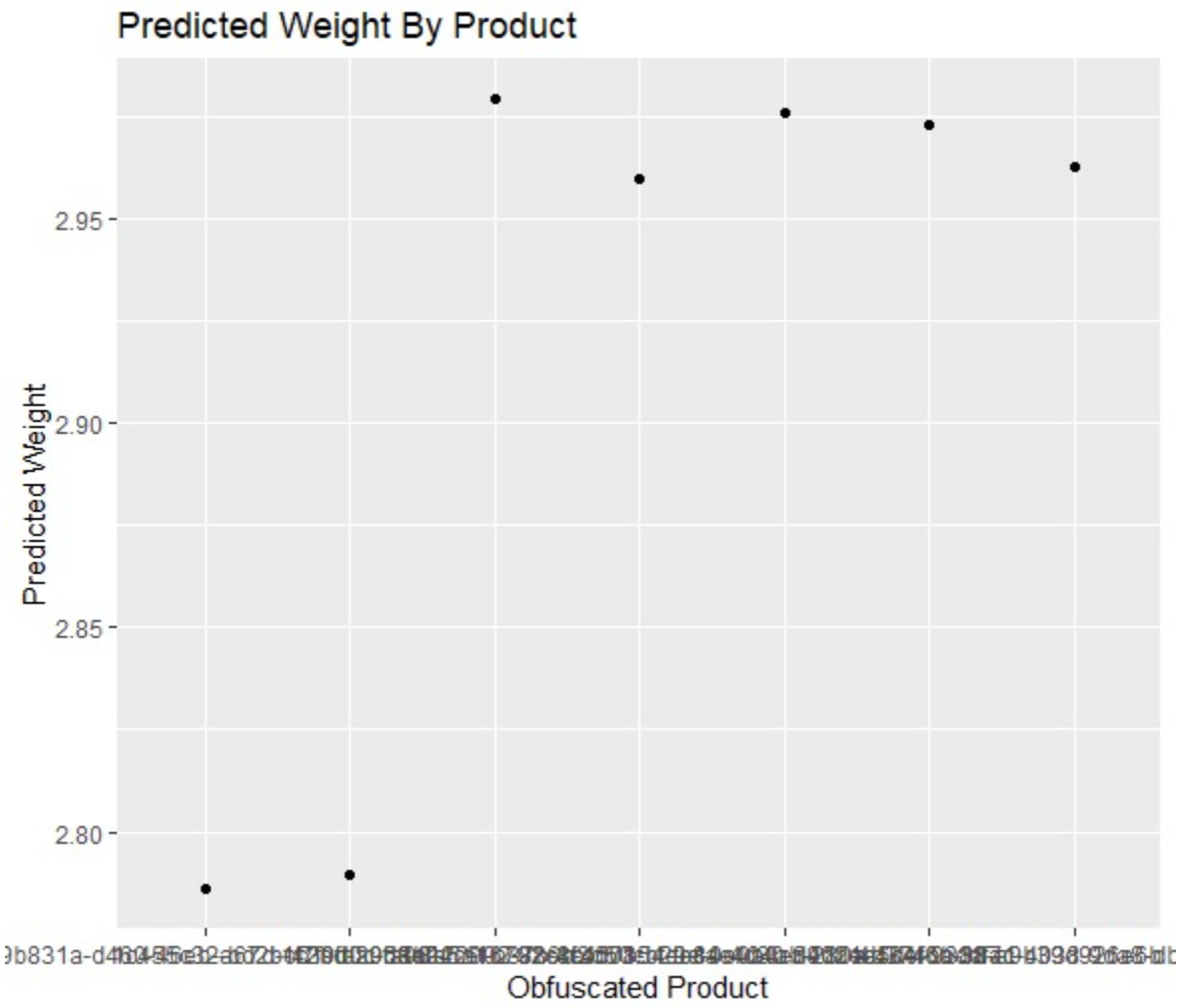


Feature Importance



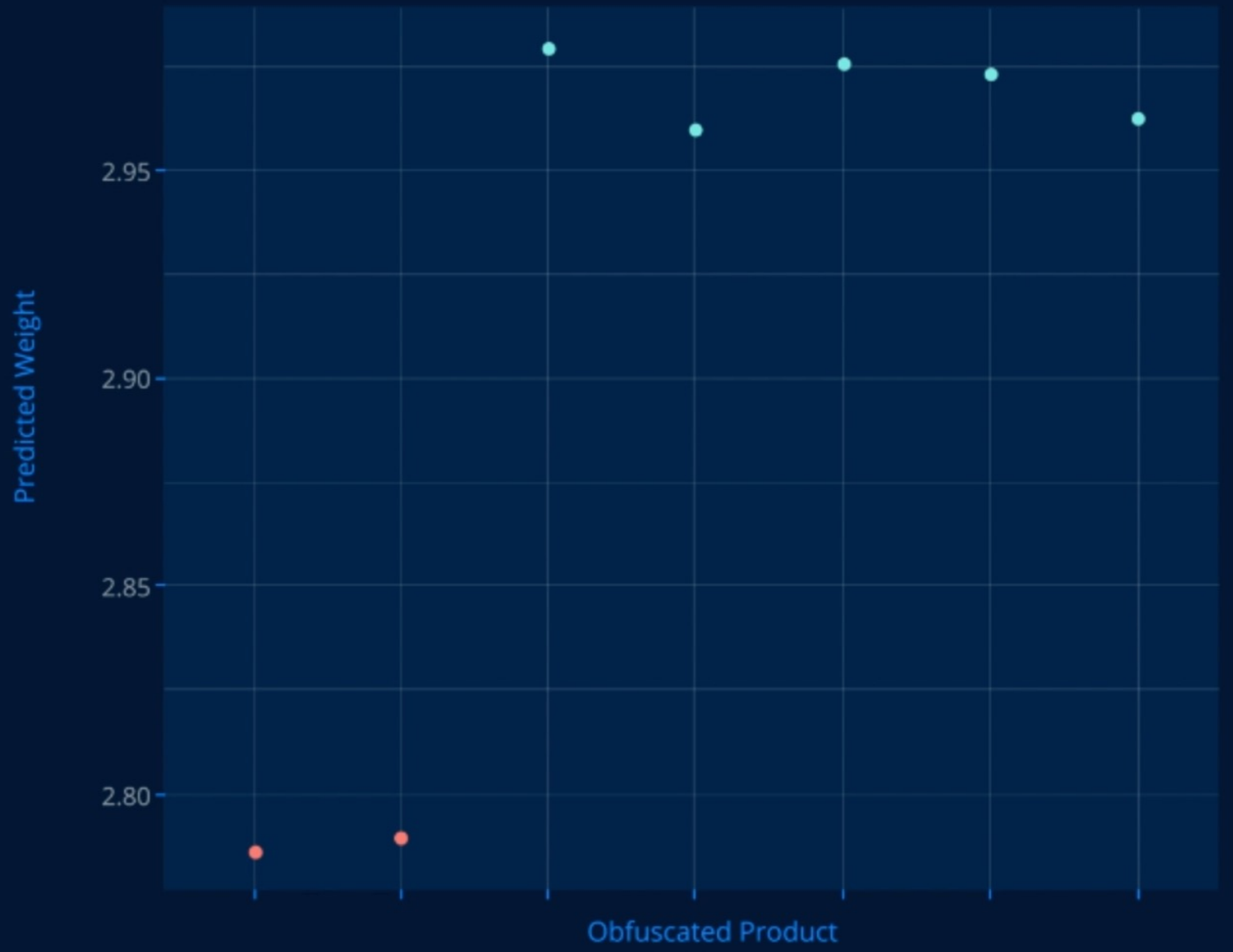
Feature Dependency

If we were to grow only these specific products this is how we would perform. Since this is essentially just a name, we included this to show only a certain range of bird weight products were included (big birds, this is in kg)



Feature Dependency

Predicted Weight By Product

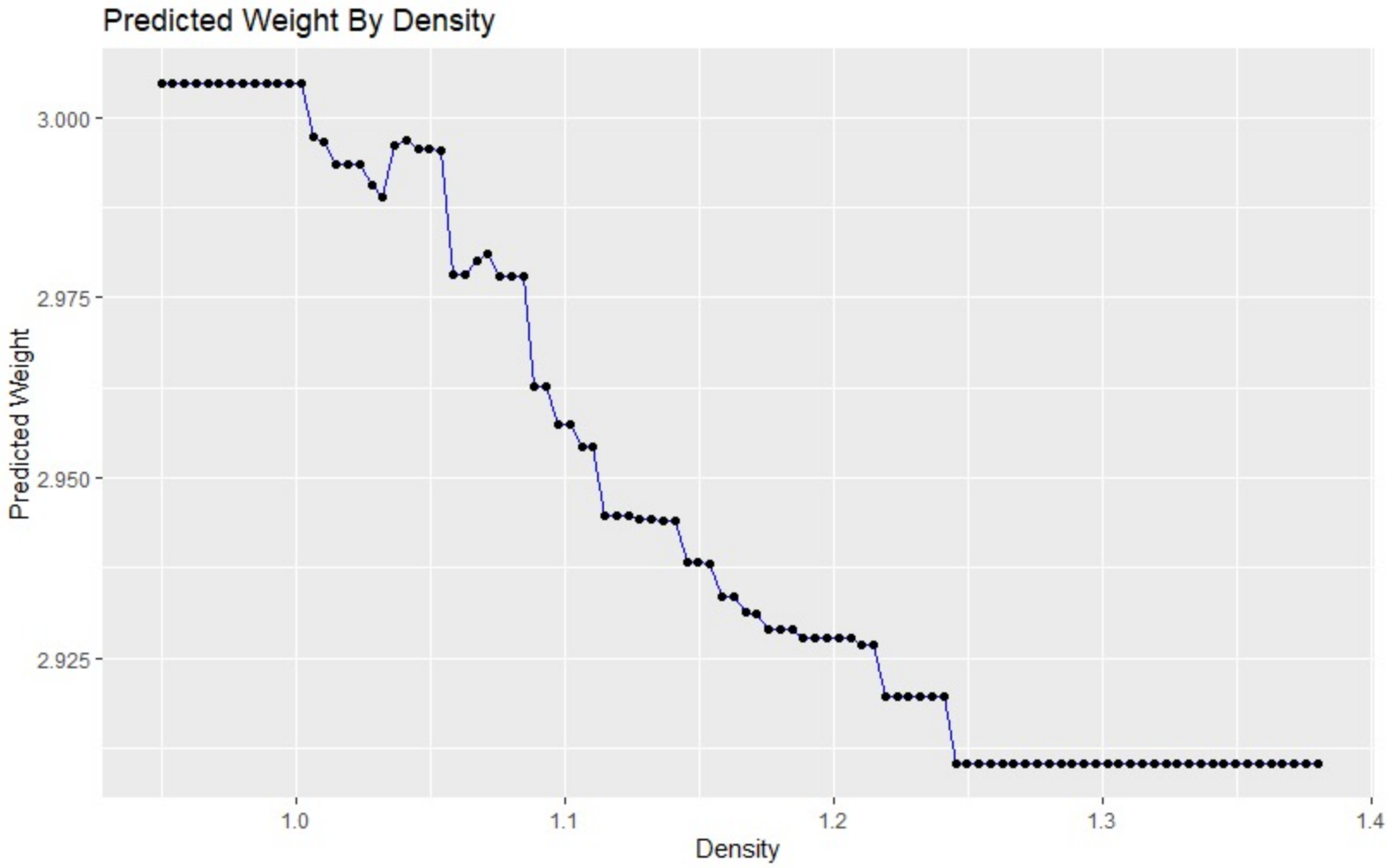


Feature Dependency

From the importance list, there was not much we could change until density.

This is showing how changing your density would have affected your business, had you made these decisions for all flocks in the past.

While this shows us something we already know, we are able to concretely come up with stocking densities to maximize head and minimize loss weight. You want to get as close as possible to the steep drop-offs without going over. With monetary values, exact close formed solutions could be found that maximize profit



Feature Dependency

Predicted weight
By Density