In 2010, 63,151 (±1,560) metric tons of antibiotics were used in global livestock agriculture, comprising an estimated upwards of 50% of the volume of medically important antibiotics used globally. Antibiotic use in livestock agriculture is thus a substantial contributor to the risk of emergence of antibiotic resistant bacteria pathogenic to humans. This problem is only expected to get worse in the future; by 2030 global use of antibiotics in livestock agriculture is projected to total 105,596 (±3,605) metric tons, a 67% increase over 2010 figures. In most countries of the world, data is poor and there is no data available on current and projected cumulative antibiotic use across their livestock industries. Van Boeckel et al and Robinson et al. provide a methodology for estimating antibiotic use in countries in which data is unavailable which will be used to do so in this project. To mitigate the risk of emergence of antibiotic resistance, policies need to be deployed to curtail the use of antibiotics across livestock industries around the world, particularly the use of antibiotics as growth promoters (AGP), by which animals are routinely administered low doses of antibiotics to speed up weight gain and improve productivity. However, AGP curtailment is not equally appropriate in each country, as projected productivity impacts from AGP phase-out and antibiotic use density (mg antibiotics/kg meat) differs across the countries of the world. This project will attempt to inform AGP phase-out policy by identifying the countries with lower projected productivity impacts given their antibiotic use density level.

**Methods: Modeling Projected Productivity Impact from AGP Phase-out as a Function of Antibiotic Use Density**

Projected impact on livestock sector productivity from AGP phase-out as a function of antibiotic use density (mg/kg meat) is modeled using data on productivity projections from OECD (2016), previously calculated values of antibiotic use by country, and total meat production figures from FAO (2015). A linear regression model was generated using R statistical software and the residuals for each country were calculated and added to the dataset. These data were joined with a World Countries shapefile from ESRI (2017) and used to generate a choropleth of the residuals. Countries with a negative residual are projected to suffer greater productivity losses from AGP phase-out given their antibiotic use density level, while countries with a positive residual are projected to suffer smaller productivity losses from AGP phase-out given their antibiotic use density level.

**Discussion**

Developing countries, particularly South Asia, are projected to see the largest increases in antibiotic use in their livestock industries through 2030. This phenomenon is in part attributable to South Asia’s projected 4.4% annual increase in meat consumption over the same time period. This is a region that is undergoing rapid economic growth and secularization of religious groups traditionally opposed to meat consumption, so this projection is not surprising. As South Asia and other parts of the developed world demand more meat, it is crucial that policymakers consider ways to limit increases in antibiotic use to prevent the emergence of antimicrobial resistance. However, this situation is somewhat more complicated: antibiotic use limits make the most sense in countries in which such a policy would be most efficient: countries projected to suffer greater productivity losses from AGP phase-out given their antibiotic use density level should be less of a focus that countries projected to suffer smaller productivity losses given their antibiotic use density level. Some of these countries with smaller projected productivity losses are relatively well off, while this is not the case for others in this group, so equity must also be taken into account by policymakers.

**Works Cited**