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Food fortification of factory farmed animals' food

Please note this is a short summary of a longer unpublished report. Sources and citations are generally the most comprehensive or relevant 1 to 3 that were found but not the only ones considered. The full report was a ~20 hour time-limited report that ended up being ~50 pages long and thus is not fully comprehensive. Our goal of this report was breadth as opposed to depth.



Description of intervention:

Intervention addresses the welfare of factory farm animals, mostly **laying hens** and broilers - fortifying feed with micro and macro-nutrients and pain killers. The price of egg production is decisively influenced by the price of feed. While farmers may reduce some production costs by producing feed by themselves rather than buying it from manufacturers and wholesalers, the majority of costs incurred remain independent of farmers, e.g. feed costs, transport cost, price of chicks, or bank interest. Feed cost is the largest single item in poultry production and accounts for 60 to 75% of the total production cost. ([source](#)). The most promising nutrients for chickens (laying hens and broilers), that at the same time are cost-effective to use, are phosphorus, calcium, and vitamin D3 ([source](#)) ([source](#)) ([source](#)). Given the high cost of feed, farmers should be able to easily include our premix into their feed, or accept the whole feed (with addition) cheaper or for free. The most promising approach is to pair up with a company that is already producing and distributing feed/premixes and pay them to add nutrition/painkillers while monitoring whether they will comply with our requirements. The biggest strength of this recommendation is the number of welfare points it is theoretically adding to an animal's life. We would like to see a stronger evidence-base to be fully confident in this recommendation.

Three sentence description of how well it does in each criteria area

Criteria	Ranking	Description
Strength of the idea	9/10	The evidence and cost-effectiveness looks strong: calcium, phosphorus, D3 - \$ 0.22; phenylbutazone - \$0.27 per welfare point. The strongest case from the perspective of evidence can be made for calcium, phosphorus and vitamin D3 supplemented feed for laying hens in cages, both battery and enriched and broilers (and maybe turkeys). The calcium requirement for hens' extremely high rate of lay is immense, and moving calcium from bone to egg shell leaves the birds prone to osteoporosis, bone fragility, and bone fractures. The outstanding disease of vitamin D deficiency is rickets, generally characterized by an even greater decreased concentration of Ca and P in the organic matrices of cartilage and bones. Supplementing feed with those nutrients would increase hens' welfare by ~22 points.

Criteria	Ranking	Description
Limiting Factor	8/10	Funding shouldn't be problematic. We put 10% probability on that it might be the next "cage free corporate outreach" type of success. Staff talent for running the organization can be taken from non-EA pool, since it would mostly be doing business with farmers. Hard to find co-founders who would want to start the project. The size of the problem and replace-ability are unlikely to be of concern in the long or short term. This intervention may have some logistical bottlenecks and more market research is needed.
Execution difficulty	7/10	This should be a fairly easy charity to found. But the feed market seems to be big and competitive (e.g. there is a risk that if a producer supplements their feed at our expense, competitors will try to undercut), so intervention might be harder to run because of competition and market dynamics. Feedback loop should be very quick in most cases and even in longer term cases, traction should be relatively straightforward to evaluate. Additionally, metrics of success are easy to measure, e.g. broken bones rate, and are informative even if taken only once per chicken's life.
Externalities	9/10	There are some concerns regarding humane-washing but the main considerations seem to apply equally to other welfare improvements, such as cage free. Skills and lessons learned in this field would be transferable to other outreach and cooperation with the industry-type of interventions. The nonprofit field is currently non-existent, but can be relatively easily established. However, in the absence of a new charity, that seems unlikely to happen in the next 5-10 years. No SARP-small animal replacement problem (program won't affect larger animals more than smaller animals). The intervention doesn't challenge speciesism strongly, so long-term externalities are less promising, but it might extend the moral circle to the point where needs of animals are recognized without challenging species discrimination at its roots.

Remaining crucial considerations affecting this area

- **Is it possible to pair up with a company** that is already distributing feed/premixes, e.g. **Tyson Food**? - would determine the choice of distribution chain and cost.
- **Would farmers be interested** if we would do it independently? - would determine the choice of distribution chain and cost.
- **Which feed is the most widely used** and what is the level of nutrition in it? - would determine counterfactual impact and choice of distribution chain and cost.
- **Are phenylbutazone or carprofen approved in different countries** (USA, China, India)? - would determine feasibility of feed supplementation with painkillers. How does it compare with approved painkiller, e.g. aspirin.

Biggest crucial consideration we were concerned about:

- **No direct evidence on effectiveness of such supplementation** - Overall, we feel confident in the positive effect of the chosen supplements ([source](#)) ([source](#)) ([source](#)).
- **Cost of high volume of nutrients** that would be needed to affect significant number of welfare points would be too high to make the intervention cost-effective - Overall, cost-effectiveness for chosen supplements looks strong:

calcium, phosphorus, D3 - \$ 0.22
phenylbutazone - \$0.27 per welfare point
cost of all nutrients per hen per year: \$ 4.88.



- High level of nutrition is in the farmers' interest, and **the field is already filled with for-profits producing nutritional feed premixes** - **the biggest for-profit** distributes vitamins but not macro-nutrients; economically, phosphorus is the third most expensive component in birds' diet after energy and protein ([source, page 224](#)), and **farmers are reducing the cost to minimum, therefore not providing optimal nutrition.**

We considered multiple supplements:

Vitamins: explored all, researched deeper - D, A, E, C ruled out due to lower effect on welfare than minerals (except vitamin D);

Minerals: explored all, researched deeper - calcium, phosphorus, iron, magnesium. Other macro-nutrients were ruled out because of smaller effect on welfare;

Opioids and other painkillers:

Phenylbutazone or Carprofen chosen for deeper research, the rest ruled out due to lack of evidence and effects. It is also unlikely to be a practical intervention due

to cost, as well as the lack of necessary approvals in US and Europe. More research needs to be done to determine legal regulations in India and China;



Psychiatric medication:

Antidepressants and mood stabilizers were ruled out due to potential side effects. It may also take several weeks or months before animal notice changes. Additionally, antidepressants were less

cost-effective compared to micro-nutrients; Anti-psychotic drugs start to work within 48h after intake, but a high rate of side effects, including depression, was reported in birds;

Feed improvements

unrelated to health (e.g. improving taste of feed): ruled out because it doesn't address the most important welfare concerns and doesn't significantly influence welfare points;

Unconventional

medications (e.g. heath sensation blockers): ruled out because of lack of evidence.

Most promising combinations of nutrients:

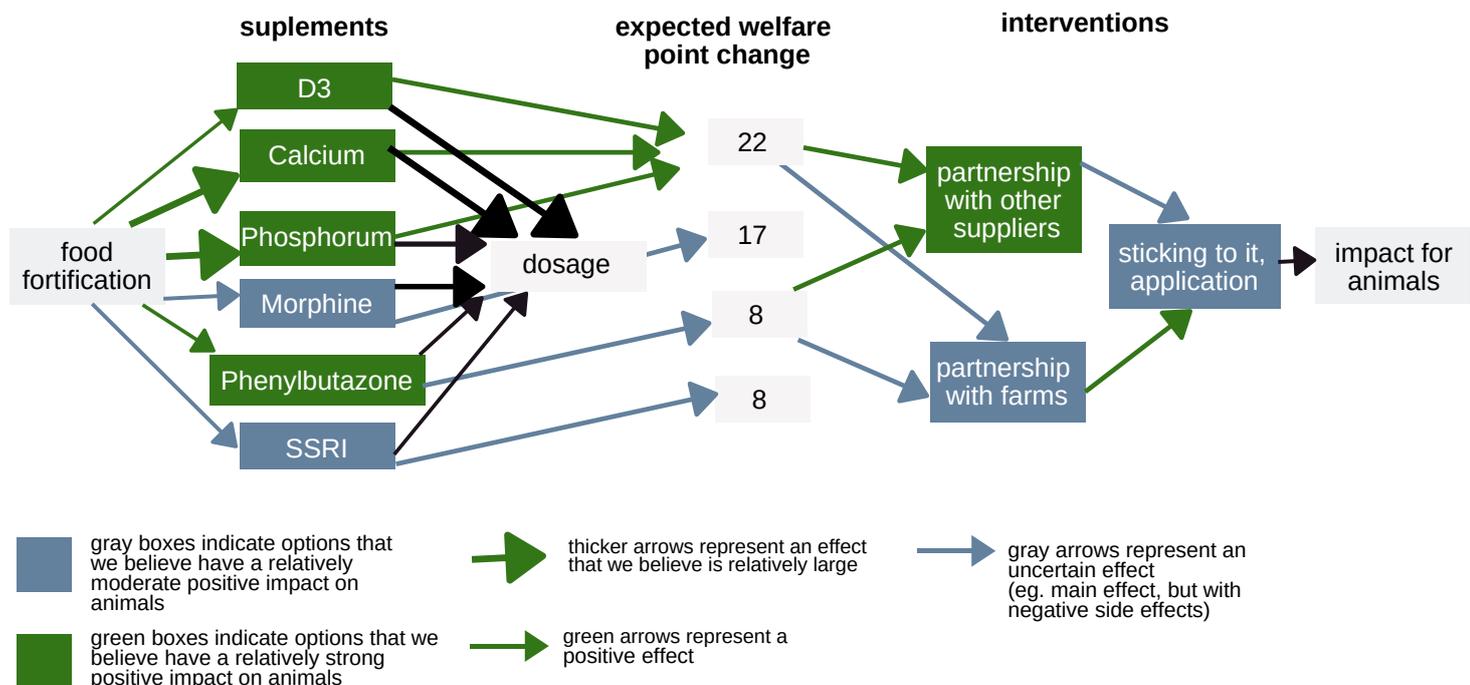
- **Calcium, phosphorum, D3 (vitamin K):** reduced bone fragility, bone fractures, and chronic pain caused by new and old fractures
- **Calcium, phosphorum, D3 (vitamin K), iron:** reduced bone fragility, bone fractures, and chronic pain caused by new and old fractures; reduced risk of anemia
- **Phenylbutazone, Carprofen and Aspirin:** direct mild reduction in pain (e.g. caused by beak amputation), alleviated chronic pain (e.g. caused by lameness)

Nutrients can be added to feed and provided to animals by 3 different ways (interventions).

List of interventions that the charity may use in the order from the most promising to the least promising (but still worth doing):

1. Pair up with a company that is already producing and distributing feed/premixes and pay them to add nutrients/pain killers, and control if they do it.
2. Premix nutrients and pain killers and give it to farmers for free as an addition to their feed.
3. Produce feed (including our additions) and make the price lower than what the farmers would usually pay for the feed.

Causal chain:



Provisional conclusion

This intervention seems moderately strong relative to others. We would expect it to fall in the top 5. It does seem worth conducting more market research to resolve the biggest crucial considerations affecting the distribution of supplements.