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Location

[Department of Veterinary Preventive Medicine](#)

Chair: Dr. William Saville
A184 Sisson Hall
1920 Coffey Road

Research

Mandell, D. J., Lajoie, M. J., Mee, M. T., Takeuchi, R., Kuznetsov, G., Norville, J. E., ... Church, G. M. (2015). **Biocontainment of genetically modified organisms by synthetic protein design.** *Nature*. Advance online publication. doi: 10.1038/nature14121

BACKGROUND: Genetically modified organisms (GMOs) are increasingly deployed at large scales and in open environments. Genetic biocontainment strategies are needed to prevent unintended proliferation of GMOs in natural ecosystems. Existing biocontainment methods are insufficient because they impose evolutionary pressure on the organism to eject the safeguard by spontaneous mutagenesis or horizontal gene transfer, or because they can be circumvented by environmentally available compounds.

PURPOSE: To computationally redesign essential enzymes in the first organism possessing an altered genetic code (*Escherichia coli* strain C321.ΔA) to confer metabolic dependence on non-standard amino acids for survival.

RESULTS: The resulting GMOs cannot metabolically bypass their biocontainment mechanisms using known environmental compounds, and they exhibit unprecedented resistance to evolutionary escape through mutagenesis and horizontal gene transfer.

CONCLUSIONS: The authors concluded that this work provides a foundation for safer GMOs that are isolated from natural ecosystems by a reliance on synthetic metabolites. Effective biocontainment mechanisms for GMOs should place high barriers between modified organisms and the natural environment.

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Conlan, A. J., Brooks Pollock, E., McKinley, T. J., Mitchell, A. P., Jones, G. J., Vordermeier, M., & Wood J. L. (2015). **Potential benefits of cattle vaccination as a supplementary control for Bovine Tuberculosis.** *PLoS Computational Biology*. Advance online publication. doi: 10.1371/journal.pcbi.1004038

BACKGROUND: Vaccination for the control of bovine tuberculosis in cattle is not currently used within any international control program, and is illegal within the European Union. Candidate vaccines, based upon *Mycobacterium bovis* bacillus Calmette-Guérin

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(BCG) all interfere with the action of the tuberculin skin test, which is used to determine if animals, herds, and countries are officially bovine TB-free. New diagnostic tests that Differentiate Infected from Vaccinated Animals (DIVA) offer the potential to introduce vaccination within existing eradication programs.

PURPOSE: To rigorously estimate within-herd transmission models to explore scenarios and the feasibility for the supplemental use of BCG vaccination in Great Britain. The authors aim to estimate the DIVA test characteristics necessary to see a protective herd level benefit of vaccination when used within the current statutory system of testing.

RESULTS: They estimate that a DIVA specificity of at least 99.85% and sensitivity of >40% is required to see a protective benefit of vaccination with no increase in the risk of missed infection. Data from experimentally infected animals suggest that this target specificity could be achieved in vaccinates using a cocktail of three DIVA antigens while maintaining a sensitivity of 73.3% (95%CI: 61.9, 82.9%) relative to post-mortem detection.

CONCLUSIONS: Field validation of the DIVA test will be an essential prerequisite to use of BCG in the field as well as changes in legislation. The estimated target specificity provides an important criterion for validation of prospective DIVA tests before deployment in the field.

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Shao, D., He, J., Lu, J., Wang, Q., Chang, L., Shi, S. R., & Bing, T. H. (2015). **Effects of sawdust thickness on the growth performance, environmental condition, and welfare quality of yellow broilers.** *Poultry Science*, 94(1), 1-6. doi: 10.3382/ps/peu003

BACKGROUND: In broiler production, intensive and modern production practices are associated with increased disease incidence which violates animal welfare proposals. Previous litter research has primarily focused on litter materials with few studies investigating litter thickness.

PURPOSE: To determine the effect of litter thickness on growth performance, immune status, environmental condition, and welfare quality of yellow broilers.

RESULTS: The results showed that a thicker litter was related to increased body weight, daily weight gain, and daily feed intake. Feed conversion ratio and mortality were unaffected by litter thickness. Absolute and relative liver weights showed a significant linear response to increasing litter thickness. The litter moisture content, air ammonia, and carbon dioxide content decreased, whereas the air dust content increased with increasing litter thickness. Litter thickness had no effect on gait, plumage damage, hock burn, or breast skin crusting. Plumage cleanliness, foot pad dermatitis, hock swelling, and breast blister varied significantly with litter thickness.

CONCLUSIONS: The authors concluded that this study showed that an increasing litter thickness improved yellow broiler growth. The litter moisture and ammonia content in the air decreased with increasing litter thickness. The welfare index scores of plumage cleanliness, foot pad dermatitis, hock swelling, and breast blisters improved with litter thickness. These results indicated that litter thickness has a positive effect on the performance and welfare of yellow broilers.

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Calendar



A full calendar of all upcoming events and continuing education opportunities offered by the College of Veterinary Medicine is available on the website at <http://vet.osu.edu/>

Ohio Dairy Health and Management Certificate Program

Module 4 – Advanced Dairy Cattle Nutrition
March 19-21, 2015

The *Ohio Veterinary Newsletter* began in October of 1974 as a way for Veterinary Extension to relay relevant information to practicing veterinarians in Ohio. The aim is to communicate pertinent news from the Veterinary Extension Unit; unbiased, research-based information with practical relevance for veterinary practitioners working in food animal, equine, and shelter medicine; and a calendar of upcoming opportunities. Please feel free to provide your feedback and let us know what information is most helpful to you and your practice.

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