Ministry for Primary Industries
Manatū Ahu Matua

Risk Management Proposal for Processed Animal Manure Products

ANMANURE.GEN

[Date]

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1 Purpose

1) The purpose of this document is to:

   a) Show how options for the management of risk organisms in mushroom growing medium containing horse and chicken manure have been assessed.

   b) Provide recommendations for import requirements.

2 Background

1) In early 2016, the Ministry for Primary Industries (MPI) became aware of importation from the Netherlands of mushroom growing medium containing horse and chicken manure. This importation was in breach of the conditions in the import permit that allowed importation of mushroom growing medium containing only synthetic urea and ingredients of plant origin. MPI revoked the permit as there was no Import Health Standard (IHS) for products containing animal manure.

2) MPI is developing an IHS for mushroom growing medium containing horse and chicken manure using the findings from the rapid risk assessment for mushroom substrate containing horse and poultry manure and from previous import risk analyses (IRAs) for chicken and duck meat.

3) The mushroom growing medium that was being imported was manufactured by Walkro International B.V., the Netherlands, and the proposed IHS is for mushroom growing medium from this company only. Production details have been provided by the manufacturer, and the production plant was visited by MPI officials.

4) MPI's strategic goal is to develop generic import health standards (IHSs) for broad product categories. A generic IHS for processed animal manure products will eventually be developed when a full IRA for this category of products becomes available. The generic IHS will contain import requirements for all products containing processed animal manure. Animal manure-containing mushroom growing medium from manufacturers other than Walkro will be considered for inclusion in the generic IHS for processed animal manure products.

3 Objective

1) The objective of the IHS is to effectively manage animal biosecurity risks associated with the import of mushroom growing medium containing horse and chicken manure, consistent with New Zealand's domestic legislation and international obligations.

4 Options assessment

1) Under Article 3.3 of the World Trade Organization Agreement on the *Application of Sanitary and Phytosanitary Measures* (the SPS Agreement), risk management measures which provide a level of protection greater than provided by international standards may be imposed only when they can be scientifically justified on the basis of a risk assessment.

2) For an analysis of hazards in horse and chicken manure refer to:

   a) *Rapid Risk Assessment: Mushroom Substrate containing Horse and Poultry Manure*, dated December 2016 (RRA 2016).

   b) *Import Risk Analysis: Chicken and Duck Meat for Human Consumption,* dated August 2013 (IRA 2013).

5 General requirements for importation of mushroom growing medium containing horse and chicken manure

5.1 COMMODITY DEFINITION

1) For the purposes of this IHS, the commodity eligible for import to New Zealand is mushroom growing medium containing horse and chicken manure manufactured by Walkro International B.V. at its plant in Blitterswijck, the Netherlands, in compliance with EU Regulation (EC) No 1069/2009, Commission Regulation (EU) No 142/2011, and the EU Council Directive 2009/156/EC. During the first phase of production, the animal manure in the product is composted in enclosed concrete compartments for a period of no less than five days. During this phase of production the animal manure in the product is composted at a temperature of 80°C, as measured by a sensor placed within the compost near the top of the pile, for no less than 72 hours.

Note

- Importers of mushroom growing medium containing horse and chicken manure will also need to comply with the requirements in the *Import Health Standard: Phase 3 Mushroom Growing Medium* (MPI.IHS.PHASE3). (*The link to this document will be added when available*.)

- Importers of mushroom growing medium inoculated with viable microorganisms (such as mushroom spawn) will also need to comply with the requirements in the *Import Health Standard for Microorganisms from All Countries* (MICROIC.ALL).

5.2 FACILITY, PROCESSING, PACKAGING AND STORAGE REQUIREMENTS

1) The production plant must have approval of the Competent Authority of the exporting country as composting plant as defined in European Union Regulation (EC) No 1069/2009.

2) The manufacture of mushroom growing medium containing horse and chicken manure must be in accordance with the requirements in Annex XI of European Union Commission Regulation (EU) No 142/2011.

3) The production plant must be audited at least annually for compliance with the above regulations, and there must not be any outstanding non-compliances at the time of exporting mushroom growing medium containing horse and chicken manure to New Zealand. The auditing must be done by the Competent Authority of the exporting country.

4) The final packaging of all consignments of mushroom growing medium containing horse and chicken manure imported into New Zealand must be:

   a) Strong enough to securely contain the product within it;

   b) Clean on the exterior and free from organic matter and other contaminants.

5) After composting to 80°C for no less than 72 hours and prior to the final packaging, the mushroom growing medium containing horse and chicken manure may be transferred to other parts of the production plant or to other production sites as long as processes are in place to ensure the product does not become contaminated by further ingredients of animal origin.

6 Recommendations for risk organisms in horse and chicken manure

1) The IRA 2013 determined that the poultry viruses belonging to the following families are exotic to New Zealand:
    - Adenoviridae
    - Astroviridae
    - Birnaviridae
    - Coronaviridae
    - Flaviviridae
    - Herpesviridae
    - Orthomyxoviridae
    - Paramyxoviridae
    - Parvoviridae
    - Picornaviridae
    - Polyomaviridae
    - Reoviridae
    - Retroviridae
    - Togaviridae

2) Polyomavirus and exotic pathogenic reoviruses are only associated with geese and ducks, respectively (IRA 2013). Therefore, risk mitigation measures are unnecessary for these two families of viruses since the mushroom growing medium would be limited to horse and chicken manure.

3) Of the remaining poultry hazards in chicken manure, infectious bursal disease virus (IBDV) (Birnaviridae) is recognised to be particularly hardy, with a marked stability against physical and chemical agents (IRA 2013). This means if a risk mitigation method (such as composting) is effective in inactivating IBDV then all other hazards associated with chicken manure will be inactivated as well.

4) MPI's CS88 predictive model was used to assess the likely effect of Walkro's composting process on the viability of IBDV (Appendix 1). Based on these composting parameters, a 23D reduction in the titre of IBDV was observed. MPI considers a >4D reduction (i.e., >99.99% of virus destroyed) in the amount of IBDV as sufficient for providing a high level of protection.

5) The RRA 2016, which was carried out for a different manure commodity, determined that the following equine hazards would likely be present in horse manure:
    - *Bacillus anthracis*
    - Borna disease virus
    - *Burkholderia mallei*
    - *Burkholderia pseudomallei*
    - Endoparasites
    - Equine arteritis virus
    - Equine herpesvirus 1
    - Equine infectious anaemia virus
    - Hendra virus
    - Horse pox virus
    - *Leptospira* spp.
    - Nipah virus
    - *Salmonella abortus equi*

6) Article 4(5) of European Union Council Directive 2009/156/EC restricts the use of unprocessed horse manure for processing into mushroom growing medium from areas subject to animal health restrictions pertaining to *Burkholderia mallei* (glanders), vesicular stomatis virus, and *Bacillus anthracis* (anthrax). The Council Directive would mean negligible likelihood the manure is sourced from horses with glanders, vesicular stomatitis, and anthrax. Since the likelihood of exposure is assessed to be negligible, these hazards are not assessed to be risks in the commodity.

7) The remaining equine hazards in horse manure are easily inactivated during the composting process described in the commodity definition (RRA 2016).

8) In conclusion, all risks associated with chicken and horse manure are mitigated to a negligible level in Walkro's mushroom growing medium when composted in enclosed concrete compartments for a period of five days in the first phase to a temperature of 80°C, as measured by a sensor placed within the compost near the top of the pile, for no less than 72 hours, and manufactured in compliance with EU Regulation (EC) No 1069/2009, Commission Regulation (EU) No 142/2011, and the EU Council Directive 2009/156/EC.

Appendix – 1: Infectious Bursal Disease Virus Reduction

1) Internationally, mushroom growing medium is produced in three stages called "phases."

2) To produce Phase 1 mushroom growing medium Walkro International B.V., the Netherlands, composts the raw materials, comprising wheat straw, horse manure, and chicken manure, for five days. For 72 hours (3 days) of this 5 day period Walkro maintains the temperature at 80°C, as measured by a critical control point (CCP) sensor placed within the compost near the top of the pile.

3) The desired temperature of 80°C is easily reached in the compost mass. Anything higher than this temperature is detrimental to the end product. Hence, the desired temperature in the compost is maintained by injection of air along the bottom of the compost pile.

4) This injection of air, and the resultant cooling effect, has created uncertainty regarding the temperature achieved throughout the compost pile, and MPI requested temperature data from Walkro from the bottom layer of the compost pile.

5) The temperature data Walkro provided were collected from four sensors placed vertically at 10, 20, 30, and 40 cm from the bottom and 200 cm horizontally into the compost pile.

6) This temperature data was subjected to an assessment on the effect of heat on the inactivation of infectious bursal disease virus (IBDV) as this organism is recognised as the most heat resistant that could potentially be present in the commodity. IBDV is one of the hazards associated with chicken manure.

7) The temperature profiles generated through the bottom-placed sensors (summarised Table 1 below) were put into the MPI CS88 IBDV predictive model, showing there was a cumulative reduction of 23.7D with a 95% confidence range of 12.7D to 34.7D. MPI considers a >4D reduction (i.e., >99.99% of virus destroyed) in the amount of IBDV as sufficient for providing a high level of protection.

8) Walkro composts the mushroom growing medium in 8 x 8 x 40 meter enclosed concrete 'tunnels'. The temperature along the bottom of the compost mass represents the coolest part of the pile. Because of the enclosed design of the tunnels it can be expected that the temperature in the remainder/other sections of the compost would be similar to or greater than that generated in the bottom section. This means the assessment done based on the bottom sensor data would hold true for all the compost in the tunnel, as long as the pile is managed at a temperature of around 80°C through the CCP sensor.

9) The production of Phase 1 mushroom growing medium is followed by two more composting steps:

    a) Pasteurisation at 57 to 60°C for 8 hours;
    b) Conditioning at 48°C for 48 to 72 hours.

10) The product that results at the end of these two composting stages is called Phase 2 mushroom growing medium.

11) For the CS88 IBDV predictive modelling, MPI did not take into consideration the above two composting steps. It is logical to expect that hazards in chicken manure would be further degraded during the production of Phase 2 mushroom growing medium.

12) Based on the above, the chicken manure in the Walkro commodity is assessed to pose a negligible biosecurity risk.

Table 1: MPI CS88 modelling result on inactivation of infectious bursal disease virus

Duration (Minutes)	Minimum temperature achieved by any one of the four sensors during this period (°C)	MPI CS88 Mean Reduction (D)	95% Minimum Confidence	95% Maximum Confidence
820	49	1.19126954	0.403231656	1.979307423
200	50	0.984887251	0.984887251	0.984887251
3180	58	2.022708911	0.366108684	3.679309137
170	60	1.359201586	0.817952992	1.900450179
140	70	1.866335553	1.275717113	2.456953994
1240	74	3.037701402	1.083775642	4.991627162
80	77	2.177878699	1.70027928	2.655478118
190	78	2.588615441	1.701799529	3.475431354
440	79	3.064450029	1.606440778	4.522459279
440	78	2.959627405	1.553070256	4.366184553
160	77	2.432472682	1.661346072	3.203599292
7060		**23.6851485**	**13.15461**	**34.21569**