DEFINING ANIMAL BIOSAFETY LEVEL 3 AND BSL3 AG

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ABSL-3

- Suitable for work with animals infected with indigenous or exotic agents that present the potential of aerosol transmission and of causing serious or potentially lethal disease [in humans] (BMBL 5)
- Facility, safety equipment, and practices applicable to clinical, diagnostic, research, or production facilities in which work is done with indigenous, or exotic agents with a potential for transmission, and which may cause serious and potentially lethal infections, or grave economic consequences if released (Applied Biosafety Vol. 12, No. 3, 2007)
ABSL-3/BSL3 Ag

- **Primary hazards/risk:**
  - Exposure to infectious materials to humans and animals in the vivarium
  - Escape of the agent to the environment
- **Emphasis on primary & secondary barriers to protect:**
  - Vivarium staff & animals in contiguous areas
  - The community of humans and animals
  - The environment
ABSL 3 Containment Levels

- ABSL 3 – for work with livestock pathogens of low consequence - described in BMBL 5
- ABSL 3 enhanced - for work with livestock pathogens of high consequence in a primary containment device – described in Appendix D, Part III of BMBL 5 and ARS 242.1
- BSL3 Ag – for work with livestock pathogens of high consequence where the room is the primary containment – described in Appendix D, Part II and of BMBL 5 and ARS 242.1
High Consequence Livestock Agents

- African swine fever virus
- Avian influenza virus (highly pathogenic)
- Classical swine fever
- Foot and mouth disease virus
- Lumpy skin disease virus
- Contagious bovine pleuropneumonia
- Contagious caprine pleuropneumonia
- Newcastle disease virus
- Peste des petits ruminants
- Rift Valley fever virus
- Rinderpest virus
Animal Caging

- Increase infectious pathogen containment with (partial or full) containment caging systems as per risk assessment.
  - Eg: Rodent-filtered top caging, inward flow ventilated enclosures, HEPA-filtered primary barrier systems appropriate to species

- When primary containment caging can not be used the animals are then considered “loose-housed” and personnel must use additional PPE and increased secondary containment.
Poultry Isolator
Ventilated Caging Systems
Respiratory Protection
All ABSL-3 work should be done in a primary barrier.

All procedures (agent, animal, sampling, necropsy, etc.) with biohazard must be conducted in a primary containment device when practical.

- Eg: Harvesting of tissues, fluids from infected animals or eggs, intranasal inoculations, etc.
HEPA filtered air from a certified Class II BSC can be re-circulated into the lab.
Doors must be self-closing and lockable.
Must be separated from general traffic flow.
Access restricted by two self-closing doors.
Clothing change room (anteroom) may be between these two doors.
- ABSL3 Shower optional (based upon RA)
- BSL3e Shower mandatory out of the animal rooms
- BSL3 Ag Shower mandatory out of the animal rooms and main building
Double door Entry

Corridor                      Anteroom                       Animal Room

FIRST AID SAFETY SUPPLIES
Animal rooms must have a sink for hand washing
- That is hands-free or automatically operated
- That is located near the exit door
- When vivarium is segregated into different zones, a sink must be available for hand washing in each zone.
- Body shower may double as a sink out of BSL3 Ag
Facility must be easily cleanable.
- No rugs or carpets
- Seams, floors, walls and ceiling surfaces must be sealed
- All penetrations sealed
- Doors and air vents must be capable of being sealed for decontamination
  - BSL3 Ag has bubble-tight dampers
A ducted ventilation system is required that:

- Will not reverse airflow in failure conditions
- Disperses building exhaust away from building supply air intake
- Provides for a visual monitoring device which confirms directional airflow at lab entrance
- Ducted system provides sustained directional air flow from “clean” to “potentially contaminated” areas
- Series of negative pressure gradients
Vivarium Room Integrity

- **ABSL3**
  - Room is leaky but capable of being sealed

- **ABSL 3 enhanced**
  - Room is tight
    - Tested for integrity by soap bubble test
  - Has controlled make up air supply (e.g. around or through doors)

- **BSL3 Ag**
  - Room is air tight
    - Tested by pressure decay test
    - No leaks around doors
Air Pressure Resistant (APR) Doors

Air Inflatable Gasket APR door

Compressed Gasket APR door
Vivarium Air Handling

- **ABSL 3**
  - HEPA exhaust filter is **optional** based on RA

- **ABSL 3 enhanced**
  - HEPA exhaust filter is **mandatory** and duct work pressure decay tested

- **BSL3 Ag**
  - HEPA exhaust filter **mandatory**, duct work pressure decay tested, with fan interlocks and bubble-tight dampers or HEPA filters on the supply
  - HEPA filters in series and parallel on exhaust and parallel on supply
Vivarium Liquid Waste Handling

- **ABSL 3**
  - Floor drains maintained and filled with disinfectant, treatment dependent upon RA

- **ABSL 3 enhanced**
  - Liquid effluent must be captured and treated
  - Floor drains are discouraged

- **BSL3 Ag**
  - As above, but to a validated EDS that can handle large amounts of liquids and some solids
  - Contained piping (single or double walled)
Liquid Waste Cooker
Autoclaves or other validated method for decontamination should be available that is convenient to the animal room.
Animal Use & Disposal

- Large animal rooms with configurable penning
- Necropsy rooms equipped to accommodate large farm animals.
- Safe disposal of the large carcasses by pathological incinerators, or other approved tissue disposal methods
When do I need one vs. the other?
- BSL3 Ag is needed ONLY when working with 11 select agents and the room is the primary containment

So how is BSL3 Ag different than ABSL3 enhanced?
- Pressure decay testing of the animal room walls (completely sealed animal room)
- Extra HEPA filtration of the exhaust
- Extra shower upon main building exit
• Work with high consequence Ag agents in the laboratory does NOT require BSL3-Ag containment

• Work with loose-housed animals with some (11) Ag agents where the room become the primary containment requires BSL3-Ag

• An onsite risk assessment is vital to determining the level of containment required to work with Agriculture agents of concern.
THANK YOU AND ACKNOWLEDGEMENT TO ALL BIOSAFETY COLLEAGUES THAT PROVIDED SLIDES