

Response to an Epizootic of Foot and Mouth Disease (FMD) in North America

A Strategy for Response to an Epizootic of FMD in North America based on the Southern Africa Approach

**Presented at the Cross Border Livestock Health Conference, PNWER - 25 July 2017
Merriot Downtown Waterfront Hotel, Portland, Oregon U.S.A.**

by

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**But first, a bit of
Lunchtime
Entertainment
in Botswana**

**A peculiar thing happened at
lunch on Sunday**

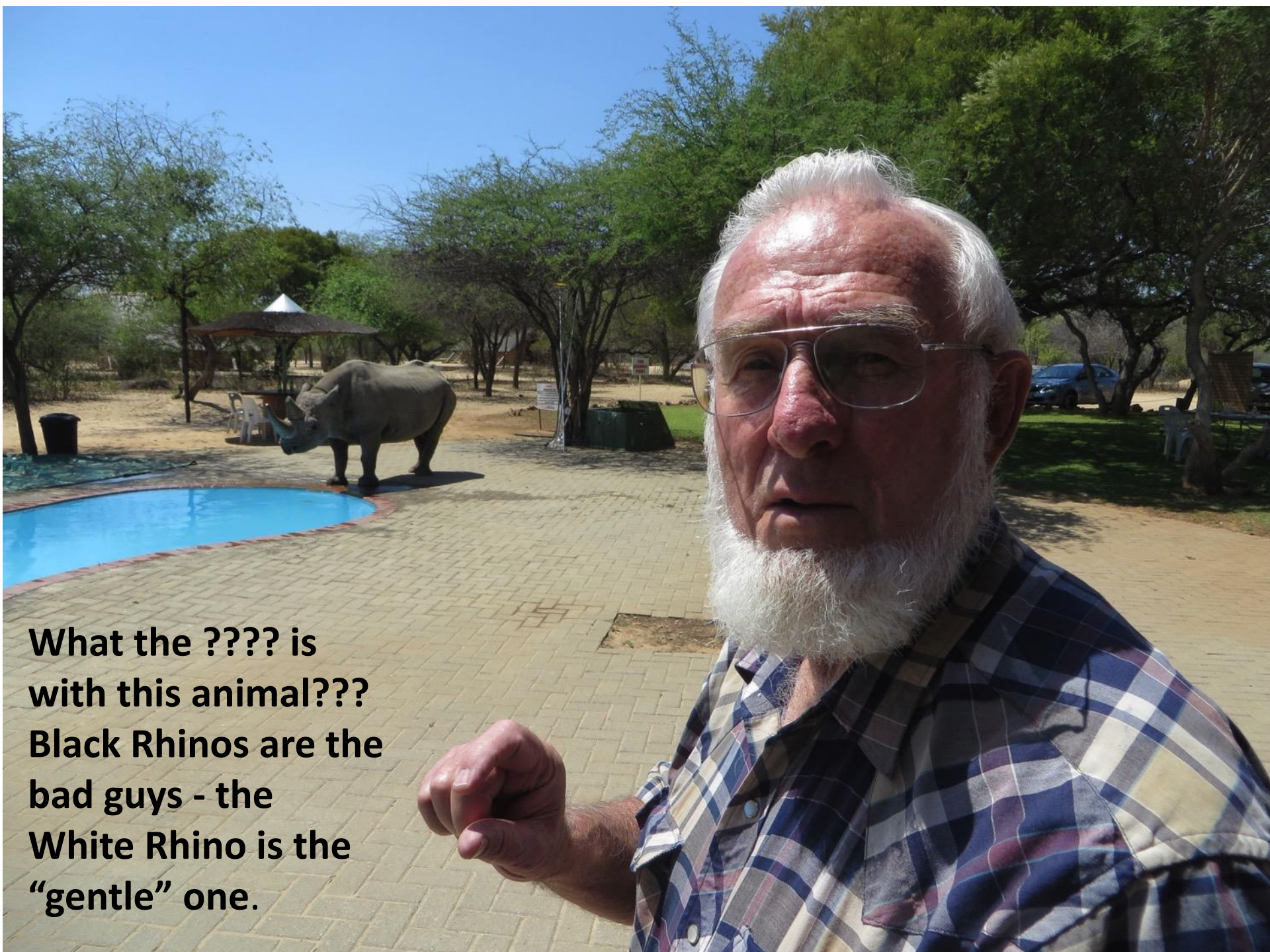
**A Black Rhinoceros came trudging
across the lawn.**





**He was hot and tired and dehydrated
and needed a nice drink of water.
The people swimming in the pool vacated quickly
and went into the restaurant.**





What the ???? is
with this animal???
Black Rhinos are the
bad guys - the
White Rhino is the
“gentle” one.

After his drink he went over to inspect
our vehicle, a Ford Ranger



I could hear his
thought

“This rig looks
Rhino-Tough
to me!!”



A bit of rest in the shade

The people came back to their table to finish lunch



Another sip – one for the road, so to speak



**“So long, guys.
See you around.”**



A quick snack



and back to the bush

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The REAL Implications of an Epizootic of Foot and Mouth Disease (FMD) in North America

The Basic Thesis

At some point North America will be infected, accidentally or intentionally, with FMD.

The Basic Facts and Necessities

A true epizootic cannot be controlled by government programs alone – it needs a great deal of cooperation between national and state/provincial agencies **and** *all levels of the livestock industries.*

The Operative Premise

Does our mode of thinking include all available options and alternatives? Does an epizootic of FMD in North America mean the death of our livestock industries? Is it really an utter disaster?

Efficacious Planning

We know a lot about “stamping out”. What have we learned from the U.K. about the functionality of that approach? *Is it workable for us?* OR – what alternatives can we consider?

The First Essential Question

Are we well prepared for dealing with a true epizootic of FMD? Not just an outbreak, but an actual widespread epizootic? Is our planning viable in light of contemporary realities concerning timing and financing and manpower and equipment and *cooperative approach?*

The Second Essential Question

Is somebody somewhere else taking different approaches that might work for us? If so who, where, and how?

Several realistic facts about the epizootic potential of FMD

1. A simulation exercise in Texas during year 2000 used real statistics (the previous year) from a livestock market. The exercise presumed exposure to FMD at the market. **The dispersal of cattle from that single market in South Texas involved 27 different counties in Texas and 5 other states within 72 hours.**

2. The UK in 2001. Pigs are infected with FMD at one site from unprocessed swill and infect local cattle and sheep. Infected sheep go to Longtown market, and the entire market is exposed by potential buyers "mouthing" (aging) the sheep. Infected cattle go to slaughter where an inspecting veterinarian finds lesions. **Within 4 weeks, one quarter of the country is involved.**

3. Questions –

- Are we prepared to handle that sort of lightning speed of spread?
- What can we do to efficaciously deal with this sort of situation??

Has the game been lost even before the initial laboratory diagnosis is confirmed?

From a USDA Foot and Mouth Disease Vaccine Solicitation letter

“FMD is arguably the greatest infectious disease threat to the U.S. livestock industry; even a small outbreak would result in devastating economic and animal health consequences.”

“FMD is arguably the greatest infectious disease threat to the U.S. livestock industry; even a small outbreak would result in devastating economic and animal health consequences.”

Does this need to be the case??

Or are there alternatives available to us we should explore???

Also --- is it wise to be advertising our vulnerability?

Foot and Mouth Disease in Southern Africa

The reservoir is in buffaloes who then expose domestic livestock



TAD SCIENTIFIC

Southern Africa is enzootic with SAT (South African Territories) FMD virus types since they evolved. The virus is enzootic in African (Cape) buffalo – *Syncerus caffer*

And yet they export beef. How do they do this? And what can we learn from them?

The “Geographic-Based” approach to FMD control has been operational for many decades. It is based on movement control of animals, both livestock and wildlife.

Dr. Gavin Thomson, a researcher there, has worked out a “Value-Chain Commodity-Based” approach for FMD disease-free beef. It is based on the processes by which the beef is produced – not on where the cattle have been.

If we look at how he has designed this approach, can it perhaps be instructive for us and can we adapt it to our livestock industries??

Southern Africa – Wildlife and Livestock

Livestock

Historically the most important commodity

Veterinary Cordon Fences (VCFs) in Southern Africa - Namibia, Botswana, South Africa, Zimbabwe

Thousands of miles of fences – the “Geographic Approach”

Huge fences – 3 meter outside fence, 50 meter dead space, 2 meter inside fence

Movement control of both livestock and wildlife

Wildlife Tourism

Increasingly important economically and is eclipsing the value the livestock industries

Fences disrupt wildlife migrations and breeding patterns and cause isolated populations

Increased pressure to realign and/or remove fences

AHEAD Project – Animal and Human Health for the Environment and Development

USAID funded

Wildlife Conservation Society – Steve Osofsky

A win-win approach that:

- 1. Supports research on “Value Chain Commodity-Based ” approach to beef production;**
- 2. Reduces need for fences and allows wildlife to migrate and expand genetic pooling;**
- 3. Is responsible for changes to OIE standards that allows for greater flexibility**

Cattle in the beef value chain in Southern Africa are constantly under potential exposure to free-roaming buffalo and thereby to FMD.



Foot and Mouth Disease in Southern Africa

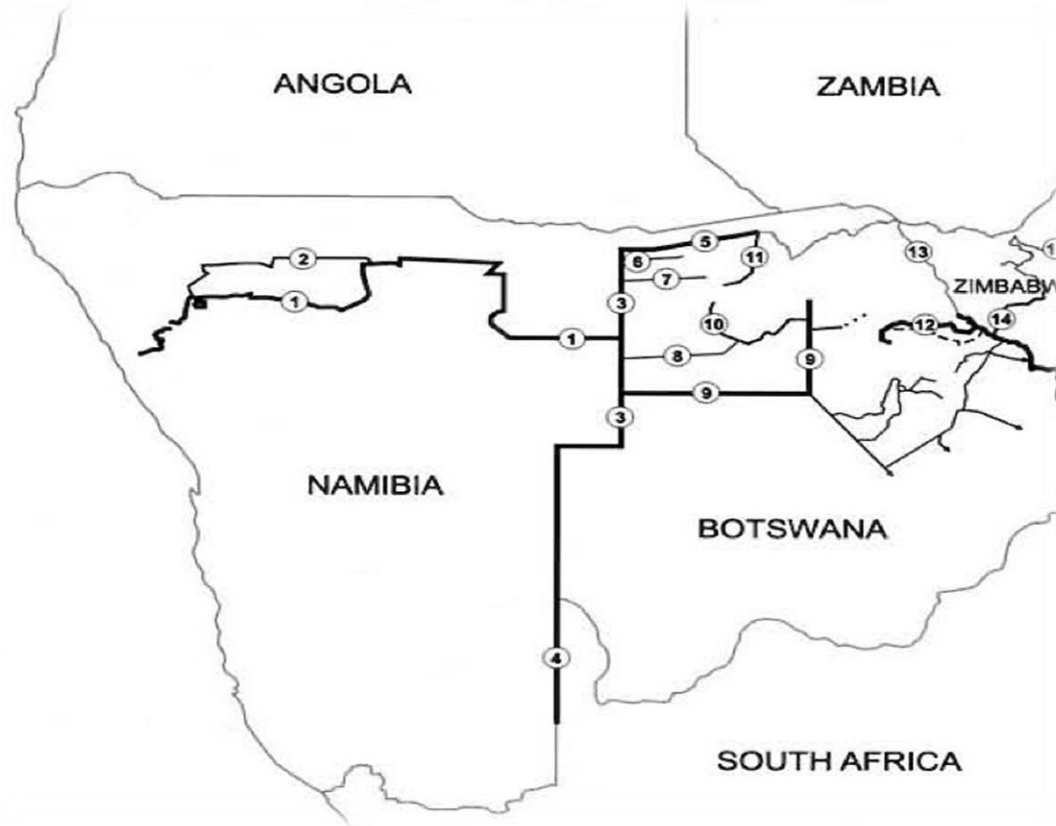
The “Geographic Approach” to FMD Control



TAD SCIENTIFIC

The “Geographic Approach” to FMD Control

Restriction of Wildlife and Livestock Movement



Approximately ~10,000 kilometers (~6,000 miles) of fences (Osofsky et al. 2005)
Huge initial expense – high recurrent maintenance expenses



A Veterinary Cordon Fence (VCF)

The Geographic Approach to FMD control

Foot and Mouth Disease in Southern Africa

**A “Value-Chain
Commodity-Based”
Approach to FMD Control**



TAD SCIENTIFIC

What is a “VALUE CHAIN”??

A value chain is the composite of the materials, people, organisations, equipment, and strategies involved in converting raw material into a ready-for-sale product.

Each step along the chain contributes to the value to the product.

In relation to foodstuffs, value chains encompass all production practices including the farm-to-fork concept, HACCP, etc.

Value chains may be highly complex or quite simple.

What is “Commodity-Based” Trade??

A commodity-based approach to livestock trade focuses on the process by which a product is produced rather than where it originates.

Commodity based trade is, in essence, selling pieces and parts rather than the whole live animal.

Split carcasses, cuts of all sorts (e.g. primals), boxed beef – these are all in the definition of “commodity”.

Process approach vs. geography approach

NOTE – In North America this is already our standard mode of operation which is a very significant point when it comes to making changes relevant to an epizootic of FMD.

The REAL Implications of an Epizootic of Foot and Mouth Disease in North America

Table

Practicality of clauses of Article 8.6.25 of the OIE's Terrestrial Animal Health Code for enabling beef exports from cattle raised in FMD-infected zones where FMD-susceptible wildlife are endemic

Clause	Comment	Recommendation
1.a The meat comes from animals which have remained in the exporting country for at least 3 months prior to slaughter	Appropriate requirement	Retain
1.b The meat comes from animals which have remained, for this period (3 months) in a part of the country where cattle are regularly vaccinated and where official controls are in operation	Appropriate requirement	Retain
1.c The meat comes from animals which were vaccinated at least twice with the last vaccination not more than 12 months and not less than one month prior to slaughter	Appropriate requirement	Retain
<p>1.d The meat comes from animals which were kept for the last 30 days in an 'establishment' and that FMD has not occurred within a 10 km radius of the establishment during that period.</p> <p>Problem – FMD is enzootic in free-ranging Cape Buffalo and there is no way to control it in that species. Therefore, it is impossible to say that there has been no occurrence of FMD within 10km of the beef animals.</p>	<p>The “Killer Clause”</p>	<p>Provision of an alternative clause: Prior to slaughter, the cattle were kept in a quarantine station (establishment?) for a period of 21 days before direct transportation by vehicle to the export abattoir; inspection of the cattle for signs of FMD was conducted prior to introduction of the cattle into the quarantine station, weekly thereafter & before release from the quarantine station</p>
1.e The meat comes from animals that have been transported in a vehicle which was cleansed & disinfected before the cattle were loaded, directly from the establishment of origin to the approved abattoir without coming into contact with other animals which do not fulfil the required conditions for export	Appropriate requirement	Retain
1.f.i The meat comes from animals which were slaughtered in an export abattoir officially designated as such, 1.f.ii The meat comes from animals slaughtered in an export abattoir in which no FMD has been detected in the period between the last disinfection carried out before slaughter & the shipment for export has been dispatched	Appropriate requirement	Retain
1.g The meat comes from animals which have been subject to ante- & post-mortem inspections for FMD within 24 hrs before & after slaughter	Appropriate requirement	Retain
2.a The meat comes from deboned carcasses from which the major lymph nodes have been removed	Appropriate requirement	Retain
2.b The meat comes from deboned carcasses which prior to deboning have been submitted to maturation at a temperature above +2°C for a minimum period of 24 hrs. following slaughter & in which the pH value was below 6.0 when tested in the middle of the <i>M. longissimus dorsi</i>	Appropriate requirement	Retain

The Solution

The new Article 8.7.22 Paragraph 1.c

c) were kept for the past 30 days in an *establishment*, and that FMD has not occurred within a 10 kilometre radius of the establishment during that period, or the *establishment is a quarantine station*;

The Very Important Changes in OIE Standards

The geographical approach has been in force for decades. Huge “Veterinary Cordon Fences” were built for thousands of miles to separate infected from non-infected areas. This seriously disrupted wildlife migrations and interbreeding of isolated wildlife populations, and because wildlife tourism is now more economically important than livestock there is pressure for the fences to be modified and/or eliminated.

The change is from a geographically based definition **(no meat from animals within 10 km of an outbreak)** to a value-chain commodity-based definition (vaccination and disease control program active, sanitary restrictions on slaughter livestock, etc), and is related to the Southern Africa research that was based on uncontrollable wildlife interactions.

The Value Chain Commodity Based approach to beef production allows for this to happen – and everybody (livestock industries and wildlife tourism industry) “on both sides of the Veterinary Cordon Fence” issue wins.

The Very Important Changes in OIE Standards

Why is this important to us???

Question –

When we, here in North America, have an epizootic of FMD

and there is infected wildlife (cervids, feral swine, etc),

how would we know if there is infected wildlife within 10km of where the cattle are or have been? How could we be OIE compliant?

Answer – *we don't need to know.*

If we are using a value-chain commodity-based approach and are OIE compliant with the new regulation, we can continue business.

Infected wildlife has historically been an enormously important and immutable factor.

*This is a critically important point
and a giant leap forward*

**Here in North America our problem when
we have an epizootic of FMD**

**is to produce beef that is
guaranteed to be free of
FMD virus.**

How?

How??

In Southern Africa the concept is a combined approach of:

- A. HACCP Based Food Safety;
 - and
 - B. Value-Chain Commodity-Based FMD Disease Risk Management
- Combined**

How??

*And remember that comment a while ago, about
“Commodity-Based Trade”?*

*NOTE – In North America this (the Process Approach)
is already our standard mode of operation*

*which is a very significant point when it comes
to making changes relevant to an epizootic of FMD.*

The point –

**We are already well positioned to make use
of this Value Chain Commodity Based
approach idea when it becomes necessary.**

FOOD SAFETY RISK MANAGEMENT

Prerequisite programme for food safety -
defined by producer agreement

FIELD

TRANSPORT

QUARANTINE

Good hygiene/manufacturing practice plan & implementation
Pre- & post slaughter health inspection

ABATTOIR

HACCP accredited processing plant
Application of good hygiene practice

FURTHER
PROCESSING

HACCP accredited processing plant
Application of good hygiene/manufacturing practices

PACKAGING
& TRANSPORT

ANIMAL DISEASE RISK MANAGEMENT

Prerequisite programme for animal disease
management - defined by producer agreement

Mechanised transportation (no trekking)
Vehicle decontamination/disinfection

Revaccination against specified diseases, especially FMD
Entry & exit health inspection

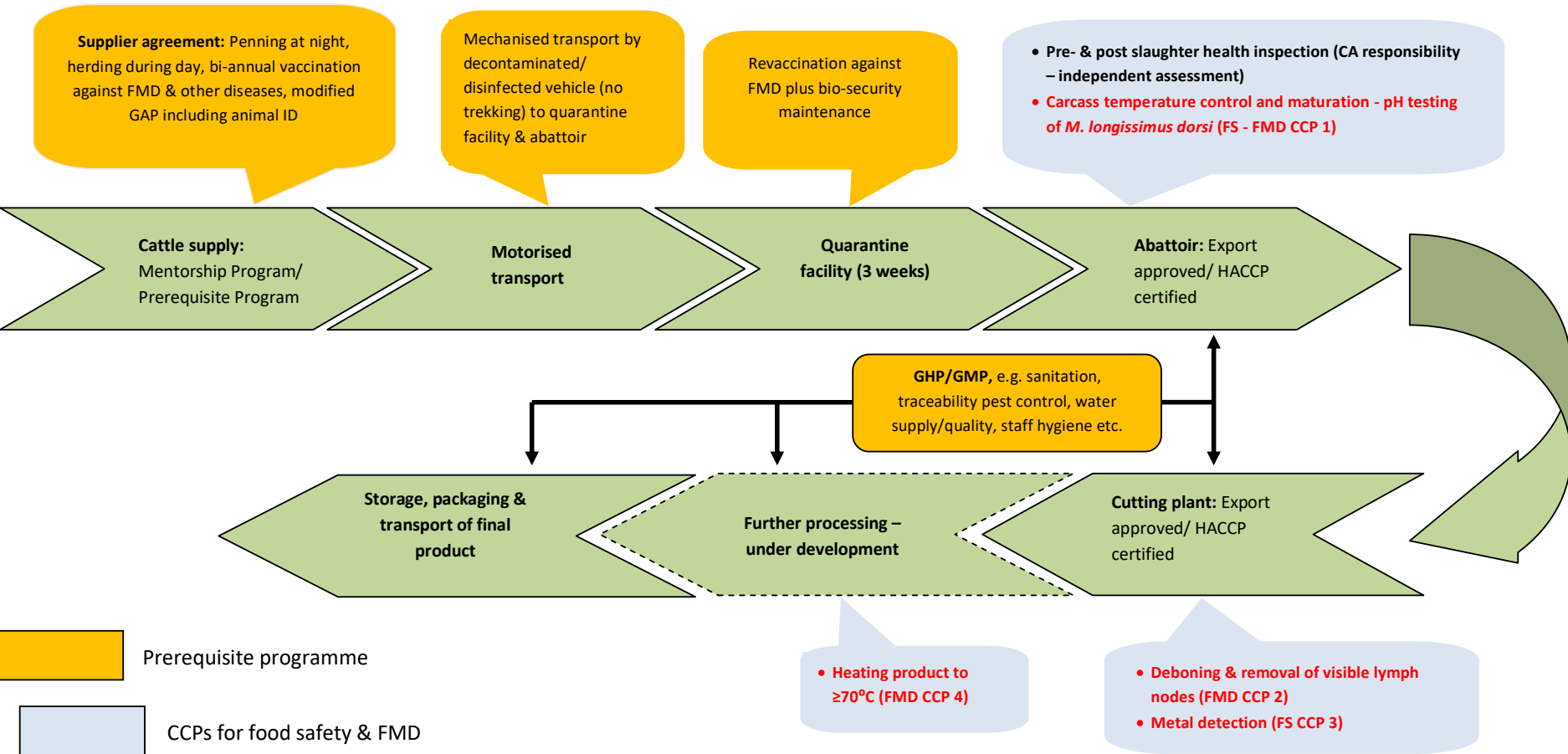
Pre- & post- slaughter health inspection
Carcass temperature control
Deboning & lymph node removal
Maturation (pH < 6.0)

For some products, heating to 70°C

Compliance with international & specific
purchaser requirements

Beef produced using integrated HACCP/CBT food safety & animal disease risks management

⇒ Appropriate level of protection (ALOP)



Proposed value chain management for beef and beef product export from the Caprivi, Namibia

Characteristics/advantages of the proposed Value-Chain Commodity-Based system

- Has sound theoretical & technical basis.
- Overcomes the killer clause of Article 8.6.25 (1.d)
- **Implementable where infected wildlife occur and contact control is not possible.**
(This is a very, very critical point both in Southern Africa and potentially in North America as well)
- Shown to achieve 'equivalence' with OIE Standards, thereby providing a marketing tool

(Note – implementation of this approach is just beginning in Southern Africa (late 2016) and experience will bring maturity to the program)

So how do we adapt this to our livestock industries in North America ***if/when*** we have an **epizootic?**

1. This is not just a government problem – it is primarily a livestock industry problem.
2. The elements of the Southern African industries are very much like our own.
3. If we analyze what they have done and apply to ourselves, we can make the components of the Southern Africa concept fit our situation.
4. Following is a visualization of the Southern African model – and then a visualization of what it might look like in North America.

** “When” and “If” are entirely different terms.*

Schematic presentation of a possible model for Country X in SSA (Sub-Saharan Africa) to enter trade in safe commodities (CBT = Commodity Based Trade) with Country B

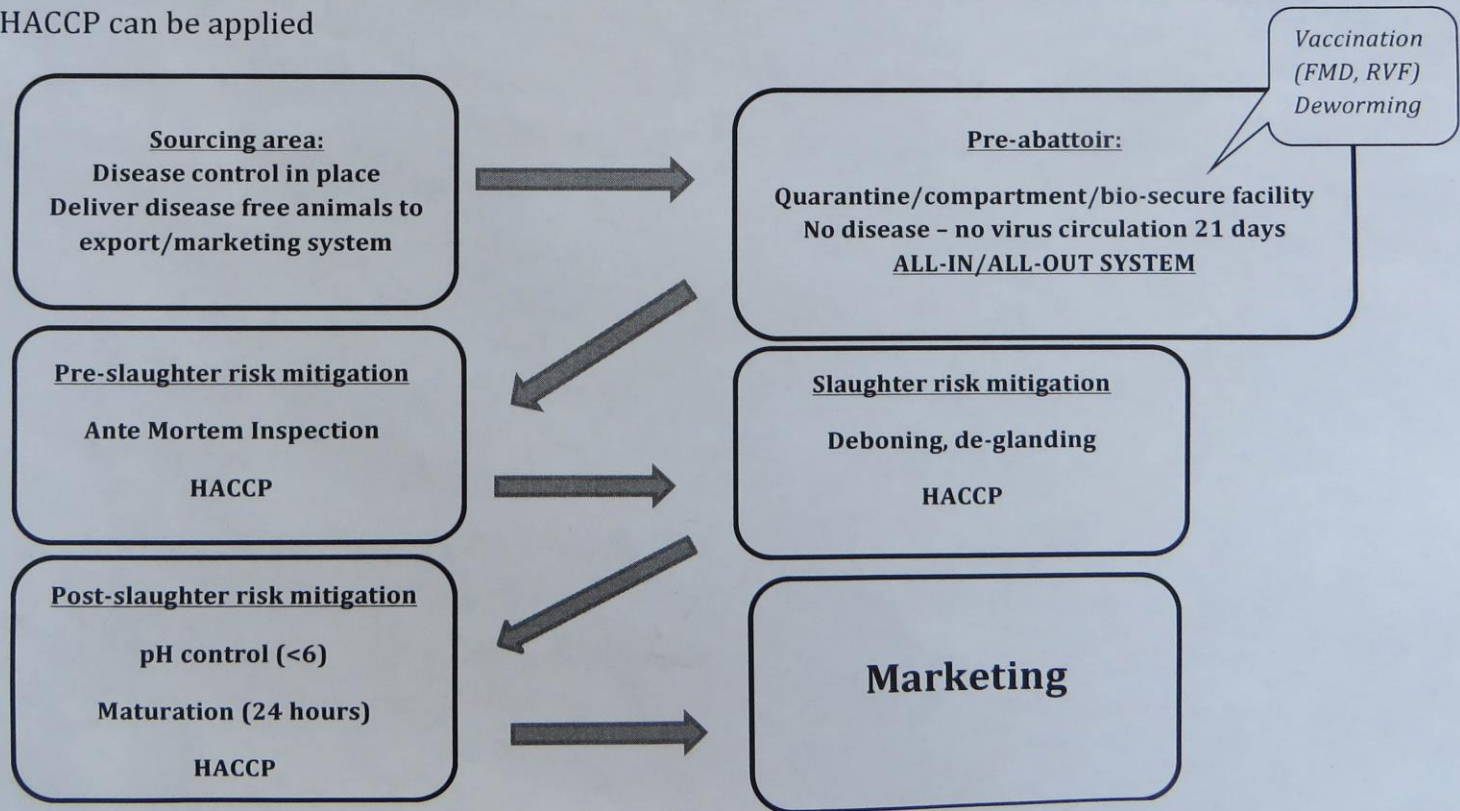
Assumption 1: Country X does not have free zones for FMD, CBPP or RVF while CCHF, LSD and bluetongue are present.

Assumption 2: Country X has negotiated with a potential trade partner (Country B) on the level of protection required for the safe import of deboned beef into Country B

Assumption 3: Cattle can be sourced from areas where disease control programs are in operation e.g. vaccination for FMD.

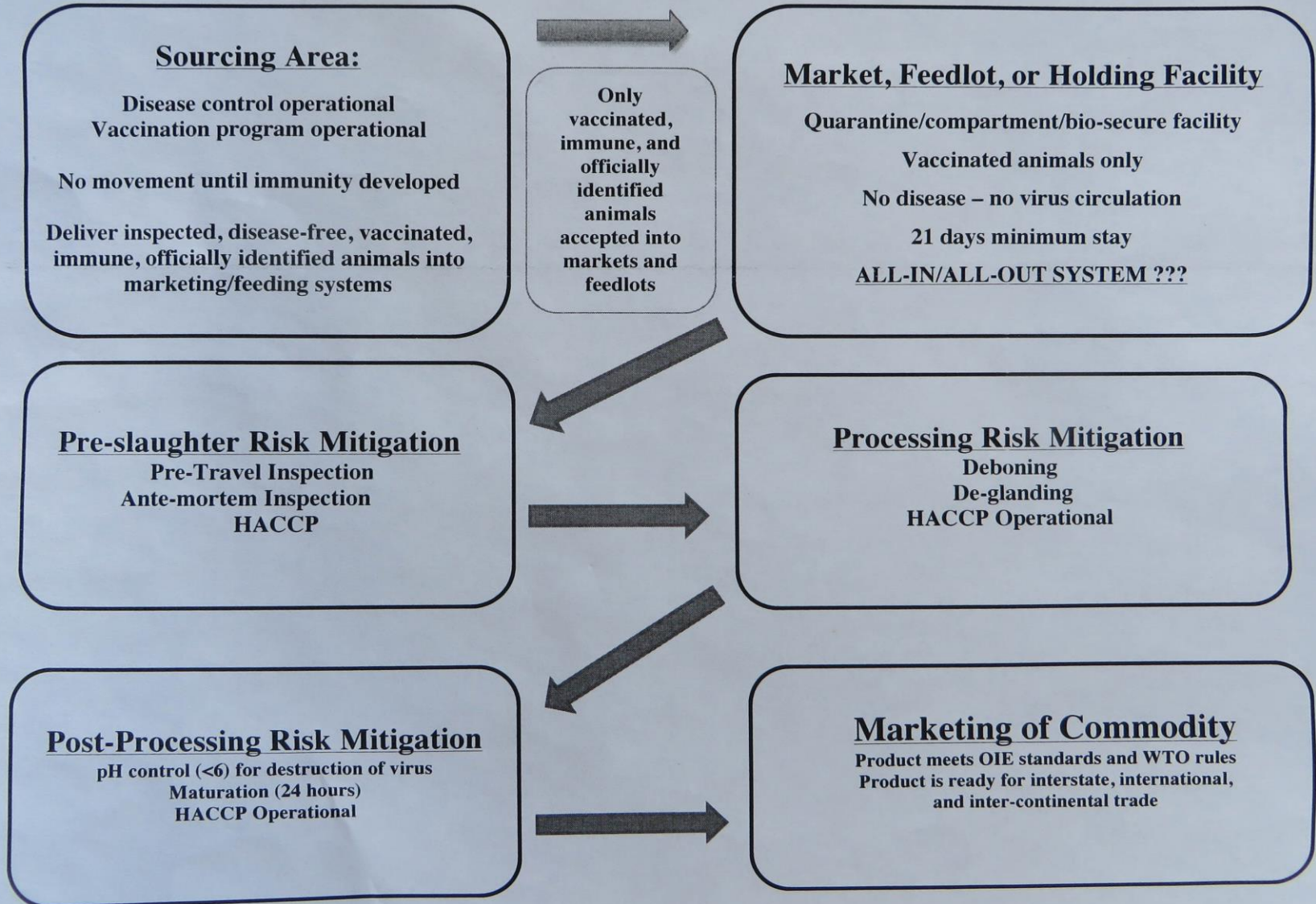
Assumption 4: Animals will be kept in a pre-abattoir disease free facility (compartment or bio-secure facility/quarantine camp) where further risk mitigation will be applied

Assumption 5: A slaughter facility compatible with acceptable export standards are available where pre-slaughter risk mitigation and HACCP can be applied



Schematic Model for Livestock Commodity Trade From An FMD Infected Area in the U.S.

(Adapted from Gavin Thomson *et al* Research in Southern Africa)



So how do we adapt this to our livestock industries in North America ***if/when*** we have an epizootic?

Am I being overly pessimistic?

Why am I harping on an

“epizootic” rather than an

“outbreak”

Following is a quick fact that to me illustrates the magnitude of what we are up against for establishing control.

The REAL Implications of an Epizootic of Foot and Mouth Disease in North America

So how do we adapt this to our livestock industries in North America ***if/when*** we have an epizootic?

In the United States, each day there are about 1,000,000 swine and 400,000 cattle being transported on the roads from one place to another— every day.

(ref. Roth et al White Paper)

With that much livestock moving, what is the true reality of our Vet Services for controlling spread???

Outline of a Value-Chain Commodity-Based approach for FMD Control/Eradication in North America

- A. The Basic Thesis – Planning for response to an epizootic of FMD in North America**
- B. The OIE Standards and WTO trade rules – Conforming our production to comply**
- C. The Components – A potential program for working with an epizootic of FMD**
- D. The Actions Required – Control the epizootic of FMD**
- E. The Conclusion - A strongly cooperative approach is needed by governments and livestock industries of all North American nations.**

A. The Basic Thesis

A significant FMD epizootic in North America will be beyond the capabilities of the State/Provincial and Federal/National regulatory systems to control. Livestock industries, for their own self-protection, will need to take significant responsibilities within a control program.

If the goal is to keep the livestock industries at least basically operational instead of being destroyed, this is at heart an industry issue. Remember the “*devastating economic consequences*” in the fourth slide?? A pathway to establish control might be:

1. **Oversight of planning** for and implementation of a control/eradication program – State/Federal and Provincial/National Government agencies;
2. **Mass vaccination** – accredited veterinary practitioners and livestock owners;
3. **Quarantine of exposed and infected livestock** – government designed control program, implementation in concert with livestock industries;
4. **Movement control** – livestock industry in concert with marketing and livestock transport industries;
5. **Quarantined disease-free feedlots** – feedlot industry;
6. **Modify slaughter and processing to meet OIE and WTO standards for clean commodity** – slaughtering & packing industries.

B. The OIE Standards – TAHC Article 8.8.22 (2015)

Provisions of Article 8.8.22 in the OIE's Terrestrial Animal Health Code (TAHC) dealing with recommendations for the importation of fresh meat (excluding feet, head and offal) from cattle located in FMD infected countries or zones with an official control programme for FMD including compulsory vaccination of cattle.

Veterinary authorities should require the presentation of an international veterinary certificate attesting that the entire consignment of meat:

1. comes from animals which:

a. have remained, for at least three months prior to slaughter, in a zone of the exporting country where cattle are regularly vaccinated against FMD and where an official control programme is in operation;

b. have been vaccinated at least twice with the last vaccination not more than six months, unless protective immunity has been demonstrated for more than six months, and not less than one month prior to slaughter;

c. were kept for the past 30 days in an establishment, and that (KILLER CLAUSE) FMD has not occurred with a 10 kilometre radius of the establishment during that period, or (relief clause) the establishment is a quarantine station;

The REAL Implications of an Epizootic of Foot and Mouth Disease in North America

- d. **have been transported, in a vehicle which was cleansed and disinfected** before the cattle were loaded, **directly from the establishment of origin or quarantine station to the approved slaughterhouse/abattoir** without coming into contact with other animals which do not fulfil the required conditions for export;
 - e. **have been slaughtered in an approved slaughterhouse/abattoir:**
 - i. which is officially **designated for export**
 - ii. **in which no FMD has been detected** during the period between the last disinfection carried out before slaughter and the shipment for export has been dispatched;
 - f. **have been subjected to ante- and post-mortem inspections** within 24 hours before and after slaughter with no evidence of FMD;
2. **comes from deboned carcasses:**
- a. **from which the major lymphatic nodes have been removed;**
 - b. which, prior to deboning, have been **submitted to maturation** at a temperature greater than + 2 °C for a minimum period of 24 hours following slaughter and in which **the pH value was less than 6.0** when tested in the middle of both the longissimus dorsi muscle(s).

So let's go back slide No.27 about

“The Solution”

The new Article 8.7.22 Paragraph 1.c

c) were kept for the past 30 days in an *establishment*, and that FMD has not occurred within a 10 kilometre radius of the *establishment* during that period, or the *establishment is a quarantine station*;

**How about we transform our
feedlots into
“Quarantine Stations”**

This idea has potential merit, doesn't it?

**The livestock are going to be there anyway, aren't they,
and for at least the required 30 days?**

C. The Components

In terms of preparedness, the need would be to design and establish a system that relies on eight basic components:

1. [State/Provincial and Federal/National Veterinary Services](#) – program design, technical input, program coordination, tracing and tracking, epidemiology, and general management;
2. [Accredited private veterinary practitioners](#) and animal health technicians – vaccination, official identification of vaccinates, health inspections, Certificate of Veterinary Inspection (CVI) for movement;
3. [Livestock producers](#) – ensure vaccination, comply with movement restrictions;
4. [Livestock Inspectors](#) – confirmation of vaccination, documentation for transport;
5. [Livestock transporters](#) – move only officially vaccinated and identified livestock;
6. [Livestock marketers](#) – accept only vaccinated livestock with official FMD identification and keep very accurate records of transactions;
7. [Livestock feeders](#) – accept only vaccinated and officially identified animals, establish and maintain quarantined feeding and holding facilities ,keep accurate records ;
8. [Slaughter/packing](#) – accept only vaccinated and officially identified animals from quarantined source and align slaughter and processing procedures to eliminate FMD virus from products – i.e. deboning, deglanding, maturing, etc. as per OIE.

D. The Actions, 1-15 for starters (and many more):

- 1. Equip all Accredited Veterinarians (and their staffs?) to vaccinate and identify vaccinates;**
- 2. Animals do not leave ranch or farm until immunity is created;**
- 3. Work with the packing industry to realign their operations to produce safe product;**
- 4. Begin with the transporting, marketing, feeding, and packing industries. For their own and the general livestock industry's sake, they accept only officially identified vaccinated animals.**
- 5. Veterinarians write Certificates of Veterinary Inspection (CVIs) only for officially vaccinated and identified animals that have had time to develop immunity – no ID, no CVI.**
- 6. Identification/ownership inspectors (Brand Inspectors) provide documents only for officially vaccinated and identified animals that have had time to develop immunity – no ID, no permit, no movement.**

The REAL Implications of an Epizootic of Foot and Mouth Disease in North America

- 7. Transporters do not accept non-ID'd animals be it for trading or pasture or feeding or breeding or slaughter or any other movement - no ID, no movement;**
- 8. Markets and traders buy only animals that are officially ID'd be it for trading or feeding or breeding or slaughter - no ID, no buy**
- 9. Feedlots become Quarantine Stations with appropriate records systems and accept only officially ID'd animals. If vaccination performed in feedlots at beginning of epizootic, ensure that feeding is long enough to fulfill vaccine withdrawal time;**
- 10. Because no transport accepts non-ID'd animals, movement to pasture and for management purposes would be controlled;**
- 11. Non-compliance with movement or other program requirements must have significant repercussions and must be industry driven. This is industry self-survival;**

12. This in large part an industry self-protection program. The government system simply cannot handle the entire burden of work, so if the industry wants to continue it must self-enforce control of epizootic spread.

Government can cover design of program, work with industry components, and deal with vaccination – but industry must accept major responsibility:

13. Wildlife – Implications of infected wildlife in terms of carrier status and reinfection of domestic livestock. Is there a need for clarification and/or research, or is an immune population of livestock sufficient for control?

14. As per OIE TAHC 8.8.22, infected wildlife does not mean it is impossible to produce and sell the products of susceptible livestock – the OIE standard stipulates how.

15. This whole approach would need to be pre-arranged with the various livestock industry sectors – a great deal of communication would be necessary, for example:

- *Discussions of and agreement to the program;*
- *Clarification of design – who does what;*
- *Financial commitments – who pays for what;*
- *Clear definition of all responsibilities;*
- *Comprehensive planning of the total approach.*

Indemnity and Vaccination

There is no “culling” (“stamping out” slaughtering) and thereby no indemnity payments

There is no stamping out and no government indemnity - it cannot be afforded.

This is for the most part a non-lethal disease.

Don't begin any indemnity – it can only grow out of the ability to be continued.

Indemnity sucks resources out of other components of the control program.

Lack of gov't indemnity as enhancement for cooperation with the control program??

If industry wants indemnity, that is an industry issue

It can be an industry program.

An “Indemnity Check-off” fund – like the beef promotion check-off fund?

Administered by industry however they want to handle it.

Blanket vaccination beginning with the known outbreak area

Vaccine and identification tag are government issue, paid for by the government.

Accredited veterinarians (and animal health technicians??) administer vaccine, identification, and certification in accordance with the overall plan.

NOTE - The government program provides the vaccine and identification at no cost.

The livestock owner pays the veterinarian for services – same as any vet service.

Speed & Biocontainment

Go back to the Texas exercise ----

We need speed of initial response

ICS - (Incident Command System) for oversight

Biosecurity/containment – what the rancher does

Move livestock to center of ranch

Reduce contact of all sorts

Shut down livestock movement of all sorts

Close markets

Define scope of outbreak

Begin with targeted vaccination

Initiate and continue with mass vaccination

INDUSTRY RESPONSIBILITY IS THE KEY TO THIS SITUATION

Significant Questions

Vaccine, Vaccination, Identification, Industry Roles

1. What is the situation with a vaccine stockpile??

Is it sufficient to get started?

2. Identification is the basis of the program.

Is there a stockpile of RFID bangle-type eartags to match available vaccine? **Clip type eartags will not work.**

3. Are there in-place plans with eartag manufacturers

to immediately produce more RFID eartags as more vaccine comes into use?

4. Are accredited veterinary practitioners prepared for their role?

They are right at the heart of this whole concept.

5. Are the livestock industries thoroughly included in the planning?

Without 100% cooperation it won't work.

INDUSTRY RESPONSIBILITY IS THE KEY TO THIS SITUATION

Pain!

Will livestock industries get hurt and feel pain?

YES – of course

Will an epizootic of FMD destroy us?

NOT NECESSARILY – but it depends on working together

**WE ALL MUST CLOSELY COOPERATE
TO MAKE THINGS WORK**

A Sense of Urgency

Do we – regulatory veterinarians - feel a sense of urgency to be prepared?

Go back to the Texas exercise ----

*Are we realistic about what we can and cannot do?

*Do we need reassess our real capabilities?

✓ Acknowledge our strengths?

✓ Recognize our deficiencies?

✓ Realistically address both with the question

“Can we actually handle a fast spreading large-scale epizootic of FMD right now?”

My work language in Africa is Swahili, and there is a good term -

Ku-ji-tegemea

Ku – **to** (the infinitive)

ji – **me, myself** (reflexive form of verb)

tegemea – depend upon (verb)

Translated to English

Self Reliance

The livestock industries must take a great deal
of responsibility for themselves

E. The Conclusion

There is great need for a cooperative approach – industry components and government agencies.

The ugly fact is that if the livestock industries do not accept significant responsibility and be strongly involved, pieces of our livestock production systems will suffer very serious – perhaps lethal - injury.

Put into the context of simple survival – do or die – could a plan something like this somehow be made workable??

If we cannot cooperate and share responsibility,

we all will lose *BIG TIME!!*



Many thanks for your attention!

Photo courtesy Mary-Lou Penrith

The Water Delivery Team Cooperative Work!



Photo courtesy Satoto Livestock Projects



FREE ADVICE -
*Do not mess about
with this calf!!*

Photo courtesy Susanne Thalwitzer

Thanks for listening!!



11/02/2012

Andrew