行政院及所屬各機關出國報告

（出國類別：國際會議）

第三屆亞洲豬病控制區域會議

3rd Regional Workshop on Swine Disease Control in Asia

出國人員姓名/服務機關/職稱

劉冠志/行政院農業委員會動植物防疫檢疫局/技正

出國地區：菲律賓宿霧

出國期間：107 年 10 月 1 日至 10 月 6 日

報告日期：108 年 1 月 2 日

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行政院及所屬各機關出國報告提要

出國報告名稱：第三屆亞洲豬病控制區域會議

頁數： 19 含附件：無

出國計畫主辦機關/聯絡人/電話

行政院農業委員會動植物防疫檢疫局/陸怡芬/02-3343-2052

出國人員姓名/單位/職稱/電話

劉冠志/行政院農業委員會動植物防疫檢疫局動物防疫組/技正/02-2343-1425

出國類別：□1.考察 □2.進修 □3.研究 □4.實習 ■5.其他

出國期間：107 年 10 月 1 日至 10 月 6 日

出國地區：菲律賓宿霧

報告日期：107 年 11 月 1 日

分類號/目：F7/農產品檢疫及動物衛生

關鍵詞：菲律賓、亞洲豬病

內容摘要：（200 至 300 字）

近年來亞洲各國發生豬隻傳染病疫情不斷，造成人類與動物生命財產受到威脅。後續所帶來的社會焦慮，所衍生的防疫檢疫或撲殺措施，對各國經濟的影響更是難以估計。於近來發生口蹄疫、豬瘟與豬流行性下痢疫情，各國除積極推動防疫政策來控制疾病擴散外，更發現防疫作為常與產業經濟效益與政府經費息息相關，使得防疫政策的擬定更加複雜。世界動物衛生組織及世界糧農組織合辦本次有關討論亞洲豬病控制區域會議，主要目的係為就現行東亞區口蹄疫及其他豬病進行資訊交換及檢視區域策略，尤其近期中國大陸非洲豬瘟及日本豬瘟疫情更是國際組織及各國關注焦點，亦透過邀請歐洲非洲豬瘟專家、會議小組討論、經驗分享及意見溝通等方式，讓各與會成員國能有深度瞭解，並促成區域合作發展。

摘要

近年來亞洲各國發生豬隻傳染病疫情不斷，造成人類與動物生命財產受到威脅。後續所帶來的社會焦慮，所衍生的防疫檢疫或撲殺措施，對各國經濟的影響更是難以估計。於近來發生口蹄疫、豬瘟與豬流行性下痢疫情，各國除積極推動防疫政策來控制疾病擴散外，更發現防疫作為常與產業經濟效益與政府經費息息相關，使得防疫政策的擬定更加複雜。世界動物衛生組織及世界糧農組織合辦本次有關討論亞洲豬病控制區域會議，主要目的係為就現行東亞區口蹄疫及其他豬病進行資訊交換及檢視區域策略，尤其近期中國大陸非洲豬瘟及日本豬瘟疫情更是國際組織及各國關注焦點，亦透過邀請歐洲非洲豬瘟專家、會議小組討論、經驗分享及意見溝通等方式，讓各與會成員國能有深度瞭解，並促成區域合作發展。

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壹、緣由及目的

世界動物衛生組織(以下簡稱 OIE)及世界糧農組織(以下簡稱 FAO)認為動物疾病於區域內影響經濟及社會安全之重要性，故由 OIE 亞太區域代表處（OIE Regional Representation for Asia and the Pacific，簡稱 OIE RRAP）及 FAO 亞太區域辦公室（FAO Regional Office for Asia and the Pacific，簡稱 FAO RAP）於 107 年 10 月 2 日至 10 月 5 日在菲律賓宿霧合辦本次「第三屆亞洲豬病控制區域會議(3rd Regional Workshop on Swine Disease Control in Asia)」，除我國外並邀集菲律賓、泰國、緬甸、印尼、柬埔寨、尼泊爾、越南、日本、南韓、中國大陸、蒙古及香港等國參加，主要目的係為就現行東亞區口蹄疫及其他重要 TADs(包括非洲豬瘟(簡稱 ASF))進行資訊交換及檢視區域策略，並邀請德國及義大利專家針對非洲豬瘟防控進行分享，亦透過會議小組討論、經驗交流及意見溝通等方式，讓各與會成員國能有深度瞭解，並促成區域合作發展。

貳、出國行程表

日期	星期	行程
2018.10.1	一	去程，由桃園國際機場出發，抵達菲律賓麥克坦-宿霧國際機場
2018.10.2	二	於宿霧麥克坦島 Costabella Tropical Beach Hotel，參加「第三屆亞洲豬病控制區域會議」
2018.10.3	三	於宿霧麥克坦島 Costabella Tropical Beach Hotel，參加「第三屆亞洲豬病控制區域會議」
2018.10.4	四	於宿霧麥克坦島 Costabella Tropical Beach Hotel，參加「第三屆亞洲豬病控制區域會議」
2018.10.5	五	於宿霧麥克坦島 Costabella Tropical Beach Hotel，參加「第三屆亞洲豬病控制區域會議」
2018.10.6	六	回程，由菲律賓麥克坦-宿霧國際機場出發，抵達桃園國際機場

參、會議議程表

第一天（10 月 2 日）

時間	會議及演講主題	主講人
08:00-08:30	報到	
08:30-09:10	由代表致歡迎詞，並請各與會人員自我介紹及全體與會人員合影留念	1. 菲律賓代表 2. OIE 代表 3. OIE RRAP 代表 4. FAO RAP 代表
開幕會議:全球更新資訊		
09:15-10:00	1. 全球及區域豬隻疾病疫情狀態更新資訊報告 2. 第二屆豬病討論會議情形報告 3. OIE 陸生動物健康法典更新報告(有關豬隻疾病及生產系統福利部分)	OIE 代表(Dr. Gregorio Torres) OIE RRAP 代表(Dr. Caitlin Holley) OIE 代表(Dr. Gregorio Torres)
10:00-10:30	中場休息	
會議 1:亞洲豬病更新		
10:30-12:30	1. 日本豬瘟疫情狀態報告 2. 中國大陸近新興及再發豬隻疾病情形報告 3. 豬隻疾病控制及診斷短期訓練報告 4. 抗菌劑於豬隻疾病控制及治療之使用、限制、替代及促進報告 5. 座談會:企業化養殖及後院式養殖系統定義-政府如何與產業合作解決問題？溝通、生物安全實踐、公私伙伴關係等	日本代表 中國大陸代表 參與短期訓練者 Dr. Juan Hernandes 全體與會者

12:30-13:30	午餐及休息	
會議 2:亞洲養豬產業變化		
13:30-15:00	1. 亞洲不斷變化的養豬業:市場驅動因素、貿易、人口分佈等以及這可能如何影響疾病的傳播報告 2. 近期 SEACFMD 的風險評估以及其他已知和懷疑的 TADs 傳播因子報告 3. 緬甸豬病防控合作報告 4. 進行提問及意見討論	OIE RRAP 代表(Dr. Caitlin Holley) OIE SRR SEA 代表 (Dr. Ronel Abila) 英國劍橋大學(Dr. Juan Carlos Hernandez Garcia) 全體與會者
15:00-15:30	中場休息	
15:30-16:30	國家介紹過去 10 年國內豬隻生產的改變及發生疾病對其影響如何 1. 中國大陸過去 10 年豬隻生產改變 2. 中國大陸口蹄疫預防及控制 3. 泰國過去 10 年豬隻生產改變 4. 柬埔寨過去 10 年豬隻生產改變	 中國大陸代表 中國大陸代表 泰國代表 柬埔寨代表
16:30-17:00	提問	全體與會者

第二天（10 月 3 日）

時間	會議及演講主題	主講人
08:30-08:45	前一天及重要訊息回顧	
會議 3:描述亞洲養豬業者		
08:45-09:45	由不同國家針對其國內不同豬隻生產模式及個別疾病的挑戰進行報告	尼泊爾代表 越南代表 菲律賓代表
09:45-10:00	提問	全體與會者
10:00-10:30	中場休息	
會議 4:非洲豬瘟		
10:30-11:15	歐洲家豬非洲豬瘟的控制	義大利專家
11:15-11:45	野豬於家豬生產系統中所扮演流行病學角色	德國專家
11:45-12:30	提問	全體與會者
12:30-13:30	午餐及休息	
會議 5:針對非洲豬瘟(或其他外來疾病)預防、檢測與控制，協調關於產業與政府扮演角色及關係		
13:30-13:45	從政府觀點看邊境安全與貿易進口風險評估	菲律賓代表
13:45-14:00	從產業觀點看邊境安全與貿易進口風險評估	菲律賓代表
14:00-15:00	夥伴對話-分組討論 1. 政府對產業:應從產業那要求配合什麼? 2. 產業對政府:可從政府那得到什麼? 3. 政府/產業對其夥伴:可從夥伴那獲得什麼?	各國代表分組

15:00-15:30	中場休息	
15:30-16:30	分組報告及提問	各國代表

第三天（10 月 4 日）

時間	會議及演講主題	主講人
08:30-08:45	前一天及重要訊息回顧	
會議 6a:區域協調		
08:45-09:00	FAO 於跨境動物疫病控制之區域倡議	FAO 代表
09:00-09:45	OIE 於跨境動物疫病控制之區域倡議	
09:45-10:00	合作夥伴國對話總結	各國代表
10:00-10:30	中場休息	
10:30-12:00	主要研討會摘要延續及結束	各國代表
12:00-13:00	午餐及休息	
會議 6b:次區域協調		
13:00-15:00	分組協調 組別 1:東南亞國家聯盟(ASEAN)將根據 ASWGL 最終討論確定行動計劃 組別 2:東亞成員國針對豬病控制及非洲豬瘟區域專家網絡協調	各國代表

15:00-15:30	中場休息	
15:30-16:30	繼續東南亞國家聯盟及東亞成員國之次區域協調	各國代表
16:30-17:00	協調結果摘要及總結	各國代表

第四天（10 月 5 日）

時間	會議及演講主題	主講人
會議 7:非洲豬瘟具體策略需取決於國家背景條件		
08:30-09:00	中國大陸非洲豬瘟疫情現況及自疫情發生後所採取的策略	中國大陸代表
09:00-09:30	FAO 上星期緊急會議成果	FAO 代表
09:30-10:00	歐洲在輸入國家的主要風險和 ASFV 於農場間傳播方面的經驗教訓（考慮到東亞背景）	義大利專家 德國專家
10:00-10:45	ASF 病毒入侵國家和產業價值鏈風險途徑的識別及評估	Dirk Pfeiffer 博士
10:45-11:15	中場休息	
11:20-12:30	分組討論及報告:風險途徑與價值鏈的識別及評估	各國代表
12:30-13:30	午餐及休息	
13:30-14:00	歐洲在早期發現和控制所需優先行動方面的經驗教訓（考慮到東亞背景）	義大利代表 德國代表

14:00-14:30	早期發現及反應量能與方法來減少相關缺口	Dirk Pfeiffer 博士
14:30-15:30	分組討論及報告:如何早期發現及反應量能與方法來減少相關缺口	各國代表
15:30-16:00	中場休息	
16:00-17:00	總結	

肆、會議及演講內容摘要

第一天（10 月 2 日）

一、開幕會議:全球更新資訊

由 OIE 代表(Dr. Gregorio Torres)進行全球及區域豬隻疾病疫情狀態更新資訊報告，報告中指出全球 ASF 疫情形勢自去年以來持續惡化，且在其他豬隻疾病(如 CSF、PRRS)豬群獲得改善的狀況也很少，而豬疾病傳播有相似的風險途徑（藉由活體動物、動物相關產品移動，生物安全不足、廚餘餵養等），也須考慮到野生動物傳播的風險，人為因素在全球範圍內傳播豬病中仍扮演著關鍵角色。

OIE RRAP 代表(Dr. Caitlin Holley)進行第二屆豬病討論會議情形報告，其建議包括通過關於豬病預防和控制的區域研討會，培訓和會議，繼續加強成員，合作夥伴和機構之間的合作，及時信息共享和能力建設。提高成員對豬病在地方，國家和區域層面的社會經濟影響的認知。開展價值鏈研究和風險評估，以確定國家，區域和全球風險因素，以了解跨界和人畜共患豬病的入侵及傳播。進行研究以更了解野豬在亞洲豬病流行病學中的分佈和作用。生物安全措施和其他減少疾病措施應得到推行，並涉及私營部門，如生產者，貿易商，私人獸醫和其他服務提供者。特別對旅客提高其了解動物產品引入危害性的認識和改進控制。另 OIE 成員繼續制定並定期更新應急計劃，包括進行模擬練習和風險交流培訓，特別是針對 ASF 和其他可能出現的疾病。建立東亞成員（邀請俄羅斯）ASF 技術工作組，利用其他地區的經驗召集相關專家常設諮詢小組。東亞成員國之間將進一步探討信息共享並召開論壇，以便在技

術層面就跨界豬病的數據，疫情，病毒株等信息進行公開交流。東南亞國家聯盟(ASEAN)積極收集有關其國家 CSF 疾病狀況的基線信息，並於一個平台重新召集會議，將行動計劃納入其國家 CSF 戰略計劃。最後基於 PED 是亞洲目前優先疾病之一，應根據第 1.2 章的標準重新評估該疾病，並作為 OIE 表列名疾病及列入的陸生動物法典規範中。

OIE 代表(Dr. Gregorio Torres)進行 OIE 陸生動物健康法典更新報告(有關豬隻疾病及生產系統福利部分)，最後有強調相關修正應所有成員國同意且透明公開，目的均在促進安全的國際貿易，隨時動態調整及依循新的科學證據，保護動物健康和福利。

二、會議 1:亞洲豬病更新

由日本代表進行日本豬瘟疫情狀態報告，包括發生時序及疫情處置，報告中指出 9 月 3 日，日本岐阜市內一座養豬場有一頭豬發生急性死亡，岐阜市畜產部門向岐阜縣請求對死因進行鑑定，而 9 月 4 日至 8 日間，該養豬場陸續有 80 頭豬死亡，故岐阜縣中央家畜保健衛生所對此進行解剖檢查並懷疑是否為豬瘟感染；9 月 9 日，經過日本國家實驗室檢測，確認出現豬瘟病毒陽性反應，同日由日本岐阜縣政府證實，該市內一座養豬場發生豬瘟疫情，這也是日本自 1992 年熊本縣發生豬瘟之後，時隔 26 年首次確認發生豬瘟疫情。官方為預防豬瘟疫情擴大，岐阜縣將事發養豬場周圍道路封鎖並對牧場執行移動管制，並在岐阜市周圍五個地點設置消毒點，對畜產相關車輛進行消毒作業。 此外，事發養豬場半徑 10 公里以內的其他 3 座養豬場也被禁止豬隻運出。官方針對這次疫情投入約 2500 人負責撲殺豬隻及赴養豬場進行消毒作業，防止疫情擴大，也希望儘速能回復成為豬瘟非疫區。

中國大陸代表進行中國大陸近新興及再發豬隻疾病情形報告，報告中主為針對豬流行性下痢(Porcine Epidemic Diarrhea (PED))、矽尼卡古病毒(Senecavirus A)、豬第三型環狀病毒(Porcine Circovirus Type 3 (PCV3))、豬 Delta 冠狀病毒(Porcine Delta coronavirus (PDCoV))、豬腸道 Alpha 冠狀病毒(Swine Enteric Alphacoronavirus(SeACoV))於中國大陸發生情形及流行病學相關研究。而前揭疾病中，由中國對 PED 2017 年監測中顯示，PED 是目前威脅中國養豬業的最嚴重疾病，因它目前廣泛存在故预防控制困难。

參與 OIE 短期訓練者進行豬隻疾病控制及診斷短期訓練報告，其背景為在地區的豬病診斷和診斷中，加強亞太成員國在亞洲成員國中亞洲成員國之間在亞太地區成員國之間的關

係，溝通與協調。這次報告者為分配至中國動物疫病預防控制中心進行短期訓練，報告其受訓情形、心得與感想。

由英國劍橋大學 Juan Hernandes 博士進行抗生素於豬隻疾病控制及治療之使用、限制、替代及促進報告，報告中說明，生產者需要真正的動力及誘因來減少使用抗生素，否則仍是會備繼續使用，歐盟生產者的經驗顯示了降低抗生素抗藥性(AMR)的不同方法，未來幾年製藥商將提供各種新產品、管理技術及有效使用說明，同時需要通過立法來減少抗生素抗藥性，並加強執法，小生產者可能是控制抗生素藥物使用的一個問題，它們可能不像商業密集型農場那樣導致問題，而是另一種形式的問題。

全體與會者針對「企業化養殖及後院式養殖系統定義-政府如何與產業合作解決問題？溝通、生物安全實踐、公私伙伴關係等」議題進行座談及提出交換意見。

三、會議 2:亞洲養豬產業變化

由 OIE RRAP 代表(Dr. Caitlin Holley)針對「亞洲不斷變化的養豬業:市場驅動因素、貿易、人口分佈等以及這可能如何影響疾病的傳播」進行報告，其報告結論為人類和動物的種群和分佈正在發生變化，食物消費習慣正在改變，供應鏈更加複雜和全球化，亞洲的價值鍊和市場也很複雜，需要更好地理解。

由 OIE SRR SEA 代表 (Dr. Ronel Abila)對「近期 SEACFMD 的風險評估以及其他已知和懷疑的 TADs 傳播因子」進行報告，結論為跨國境動物疾病的跨境傳播為遵循市場鏈，現代化的道路及高效的運輸均使跨國境動物疾病的散播速度更快，在貿易、相關節日期間及源頭爆發高峰期間，使散播感染的機率提高，所以加強與交易對象和其他利益相關者的管控對於有效的風險管理至關重要。

由英國劍橋大學 Juan Hernandes 博士進行緬甸豬病防控合作報告，其防控輔導結論為透過改善農民對豬生產的了解，可以減少和更好地利用抗生素藥物。知識散播教育農民比其他都更便宜更好用。必須創建有吸引力的，文化適應性的平台來提供相關知識。智能手機及簡訊可以是一個非常強大的工具。另外獸醫的專業化是改善畜牧業生產的必要條件。舊時代的獸醫可能不需要對某領域特別專精，新時代須允許擁有超級專業的獸醫。若持續不改善，當非洲豬瘟爆發時，當前的做法會產生嚴重的危機。

由中國大陸、泰國及柬埔寨等國家代表介紹過去 10 年該國內豬隻生產的改變及發生疾病對其影響如何；中國大陸報告以口蹄疫為主，結論為國內口蹄疫控制挑戰有 O 型和 A 型仍共存，廣泛的口蹄疫傳播，大量易感受動物與後院飼養比例高，交叉跨區域的活體動物活動，因該國有 22,000 公里陸地邊界與 14 個國家相連，且非法移動和走私查緝不易，故口蹄疫的引入風險仍高。而柬埔寨的報告部分，該國未來重點工作有(1)加強牧場監督和報告系統，(2)加強實驗室能力，擴大服務範圍，以涵蓋其他疾病，(3)改善 PPP 協作，(4)提高疫苗接種覆蓋率，(5)促進農場註冊，生物安全，GAHP 認證，(6)執行現有疾病管理的立法。泰國報告部分，其重點工作為對於小農及後院飼養仍持續給予支持，建立其基本生物安全系統並防控 PRRS，將其導入良好牧場管理(GFM)，相關如疫苗(CSF/FMD/PRRS)及獸醫服務等資源仍會投入，另也會持續擴展潛在出口市場，國內牧場從認證→GAP→動物無口蹄疫到場域化，以使其產品准許輸出至其他國家，對新興和重新出現的疾病(ASF 及立百病)則進行監測。

第二天（10 月 3 日）

一、會議 3:描述亞洲養豬業者

由尼泊爾、越南及菲律賓等不同國家針對其國內不同豬隻生產模式及個別疾病的挑戰進行報告。尼泊爾報告中分享國內各種型態(大、中、小及後院)養豬場飼養情形，豬場內疾病仍以豬瘟、口蹄疫及 PRRS 為主，面臨養豬生產問題包括在複雜化生產型態下疾病監測困難，在不合標準及以廚餘餵飼增加疾病傳播風險，另在社會經濟及政策方面也面臨許多挑戰。菲律賓報告中，該國豬場生物安全挑戰遭遇問題包括(1)養豬業者生物安全意識仍不足、(2)許多流浪狗和貓恐會造成病原散播、(3)正在建設中豬場無考量到生物安全、(4)運輸車輛恐造成場和場間疾並散播、(5)集中運輸車清洗不完全造成疾病更快散播、(6)國內養豬種群數仍持續增加，疫病發生風險隨之增加、(7)養豬密度調查未完全，無法掌握田間在養狀況。越南報告部分，除介紹該國養豬狀況，另在疾病防控部分有特別說明該國 ASF 防控計畫，此計畫分為病毒未在國內檢出及在國內檢出兩個部分，未在國內檢出計畫會加強疫災處理演練、獸醫師畜牧場訪視、技術面加強活豬和豬肉運輸管控(陸路，水路，飛機)、強化進口檢疫、養豬場，貿易區，屠宰場的生物安全加強、進行主動監測、國際合作及風險分析；若發生 ASF 疫情，該國為採取發生場半徑 3 公里(控制區)豬場豬隻撲殺，半徑 3 至 10 公里(監測區)內豬場進行

監測，疫情未解除前豬隻不可從監測區移入或移出。

二、會議 4:非洲豬瘟

由義大利代表進行「歐洲家豬非洲豬瘟的控制」報告，而除說明非洲豬瘟在歐洲發生情形外，該專家認為歐洲最重要防控點在於野豬，他給予歐洲經驗教訓的建議包括(1)野豬對於非洲豬瘟是一個很大的風險、(2)野豬被動監測是唯一可以早期檢測的工具、(3)假如野外死亡的野豬應該也要進行檢測、(4)政府內獸醫部門應跟野生動物部門密切合作(若涉及野豬的根除計畫)。

由德國代表進行「野豬於家豬生產系統中所扮演流行病學角色」報告，報告最後有說明歐盟目前對於 ASF 的策略，首先對於養豬場進行分類(商業、非商業及戶外)，每種豬場需制定其最低生物安全要求規範，並定期進行查核，每年至少一次，對於場內有任何異狀豬隻應立即進行檢測，尤其每週第一至二頭死亡豬隻(離乳後)應進行監測，對於野豬措施部分，其建議為(1)擬定主要戰略要點、(2)制定受感染地區的措施、(3)獵人的最低生物安全規範、(4)進行野豬採樣監測、(6)應去除野外野豬屍體、(7)強化相關宣導。

三、會議 5:針對非洲豬瘟(或其他外來疾病)預防、檢測與控制，協調關於產業與政府扮演角色及關係

由菲律賓代表進行「從政府觀點看邊境安全與貿易進口風險評估」及「從產業觀點看邊境安全與貿易進口風險評估」報告，報告最後介紹去年 9 月 4 日至 7 日 FAO 在曼谷舉行研討會期間所做的風險評估如下:

(1)由於來自受感染國家的活豬，該國（至少 1 隻）豬感染 ASF 的風險（可能性）很低。

(2)由於從受感染國家進口豬產品而導致該國（至少隻）豬感染 ASF 的風險（可能性）為中等。

(3)該國（至少 1 隻）豬從野豬感染 ASF 的風險（可能性）是中等的。

(4)該國（至少 1 隻）豬被污染的污染物（個人物品，車輛，衣物）感染 ASF 的風險（可能性）很低。

(5)該國（至少 1 隻）從蜱感染 ASF 的風險（可能性）很低。

由各國代表分組，針對議題包括 1.政府對產業:應從產業那要求配合什麼?2.產業對政府:可從

政府那得到什麼?3.政府/產業對其夥伴:可從夥伴那獲得什麼?

第三天（10 月 4 日）

一、會議 6a:區域協調會議

由 FAO 代表針對「FAO 及 OIE 於跨境動物疫病控制之區域倡議」進行報告

二、會議 6b:次區域協調會議

各國代表進行分組協調會議及討論:

組別 1:討論東南亞國家聯盟(ASEAN)將根據 ASWGL 最終討論確定行動計劃

組別 2:討論東亞成員國針對豬病控制及非洲豬瘟區域專家網絡協調

第四天（10 月 5 日）

一、會議 7:非洲豬瘟具體策略需取決於國家背景條件

由中國大陸代表報告「中國大陸非洲豬瘟疫情現況及自疫情發生後所採取的策略」，內容主要分為中國大陸疫情現況，及發生疫情後所採取之措施，報告中指出該國於 8 月 3 日發生疫情後，於 8 月 10 日發出進行豬隻運輸管控通知，在 8 月 31 日開始針對豬隻產品運輸強化管控，於 9 月 1 日發出加強省級活豬集其產品運輸監管通知，對於疫情發生點除進行撲殺消毒、且執行標的監測、移動管制及廚餘餵飼管控，對於撲殺補償於 9 月 13 日官方也提高至每頭 1,200 元人民幣(優於因罹患口蹄疫、豬瘟及 PRRS 遭撲殺每頭 800 元人民幣價格)，於 9 月 29 日及 10 月 1 日也將陸續解除第一例(遼寧瀋陽)及第二例(河南鄭州)之管制。

由 Dirk Pfeiffer 博士報告「ASF 病毒入侵國家和產業價值鏈風險途徑的識別及評估」，其主要去分析非洲豬瘟可能由哪些風險途逕入侵，而不外乎活豬、豬肉、豬肉製品、廚餘及野豬，其重點在於各國之間存在差異，應需要了解有貿易往來國家其產業鏈及養豬業結構，以使能夠預測及評估可能之入侵風險。後由各國代表就「風險途徑與價值鏈的識別及評估」議題分組討論及報告

由 Dirk Pfeiffer 博士報告「早期發現及反應量能與方法來減少相關缺口」，報告結論為早期發現是有效應對的關鍵，ASF 於豬群內的傳播速度比口蹄疫慢，農民可能在引入後一周或更長時間才檢測到它，另需要防止野豬接觸家豬感染，因一旦 ASFV 在家豬中流行，散播至

野豬群將更難以預防及控制，最後需要有明確的策略目標。後由各國代表就「如何早期發現及反應量能與方法來減少相關缺口」議題分組討論及報告

伍、心得與建議

經本次會議瞭解目前與會代表國國內口蹄疫最新疫情現況及其他豬病防控情形。因東亞各國其飼養有許多共通之處，可藉由它國防疫經驗來檢視及加強國內現階段不足處，但也不能一昧抄襲，應更瞭解其基本背景，舉例這次有需多國家報告國內的養豬情形，而各國對於大、中、小型豬場界定都不盡相同，如在尼泊爾只要養 50 頭以上的豬隻就算大場，但這飼養規模在東亞已開發國家(韓國、日本、臺灣)只能歸為小型場。另本次會議重點為聚焦在非洲豬瘟，尤其對於中國大陸的疫情發展各國皆相當關注，本次會議參加時為中國大陸疫情剛發生，中國大陸代表於報告時感覺疫情已受到控制，然而目前顯示已呈現失控狀態，但從其報告內容及與中國代表討論交流時，其實疫情失控也不令人意外，包括(1)相關運輸及產品管制措施太晚發布，疾病已藉由此途徑散播出去、(2)官方雖然禁止廚餘養豬，但無罰則(感覺較像宣導性質)，而民間小型豬場仍照用廚餘養豬，造成病原仍在環境中持續留存、(3)對未依規定通報雖有訂定相關罰則，但罰則為多年前制定且過輕，無太大效用、(4)撲殺補償金額低(剛發生時僅補償 800 人民幣/頭，後雖然調高至 1,200 人民幣/頭，但仍比市價每頭豬約 1,400~1,600 人民幣低)，使農民初期通報意願不高，以上皆有可能造成疫情持續發生失控原因，值得借鏡。另於本次會議也可看到其他國家對於獸醫資源的投入及分工更為細緻，如歐美、中國大陸及香港，官方行政部門僅負責政策擬定及執行，而監測工作(包括申請計畫、實際執行及相關資料分析評估)則由流行病學中心或實驗室部門進行，相對於我國對於相關部門工作權責分配應值得納為參考。最後藉由參與國際會議可強化與區域國家之聯結，而我國未來有機會也應積極參與相關會議，以強化與周邊鄰近國家之疫情訊息、政策擬訂或實驗室診斷能力等相關交流。

陸、致謝

感謝 OIE、FAO 及其亞太代表處支持出席會議之出國旅費與相關安排，以及對東亞地區口蹄疫共同防治之協調與努力。

柒、附錄

一、行程照片

圖 1、第三屆亞洲豬病控制區域會議全體與會人員合影

二、研討會簡報資料（如後附）

Regional short-term training on swine disease control and diagnosis

Zhou Zhi

National Veterinary Diagnostic Center
China Animal Disease Control Center
OIE Reference Laboratory for PRRS

OUTLINE

1. Basic information
2. The regional short-term training on swine disease control and diagnosis
3. Objectives and suggestions

Basic information

- **With the development of economic globalization, the international trade in animals and animal products is becoming frequently, and the spread risk of the transboundary diseases is increasing, in order to improve the ability of prevention, control and diagnosis of swine disease in the region, we should strengthen the relationship, communication and coordination among the member countries in the asia-pacific region.**

Basic information

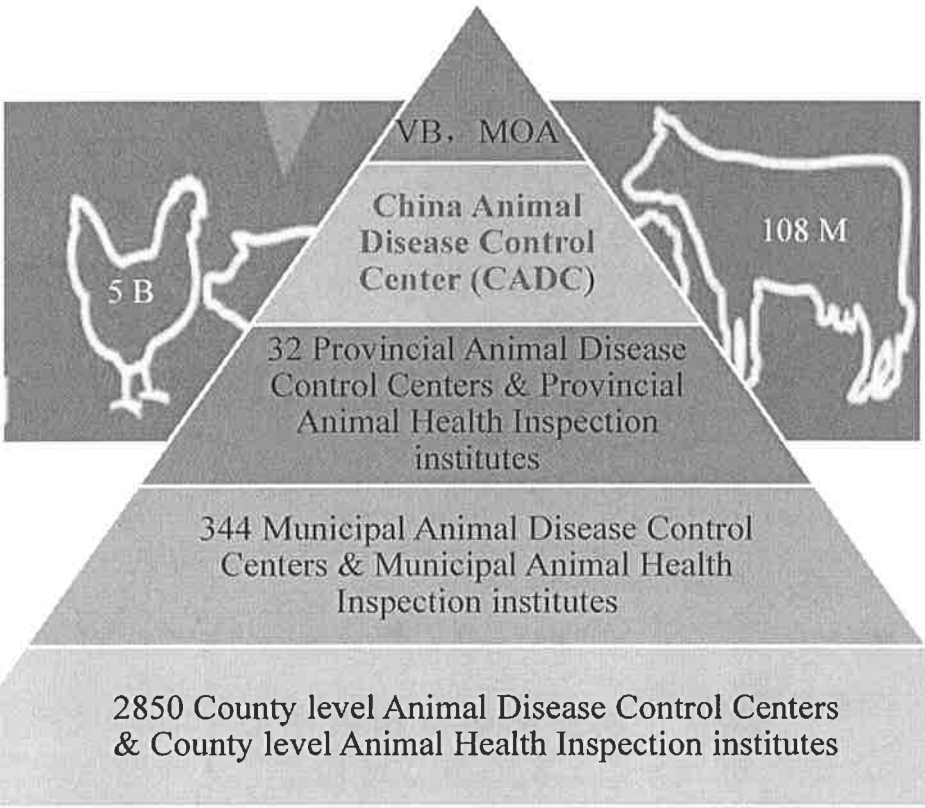
Joint FAO/OIE Workshop on Swine Disease Control in Asia. Beijing, P.R China, 18-20 November 2014.

- **Representatives from FAO, OIE and more than 10 countries and areas (China, Japan, South Korea, Cambodia, Mongolia, Indonesia, Laos, Myanmar, Philippines, Thailand, DPR Korea, and Vietnam), attending the workshop on swine disease control in Asia in Beijing in 2014. FAO and OIE experts and representatives of other countries exchanged views on the prevalence, prevention and control of major swine diseases in Asia and which the way forward to improve disease control and diagnosis capacity.**

Basic information

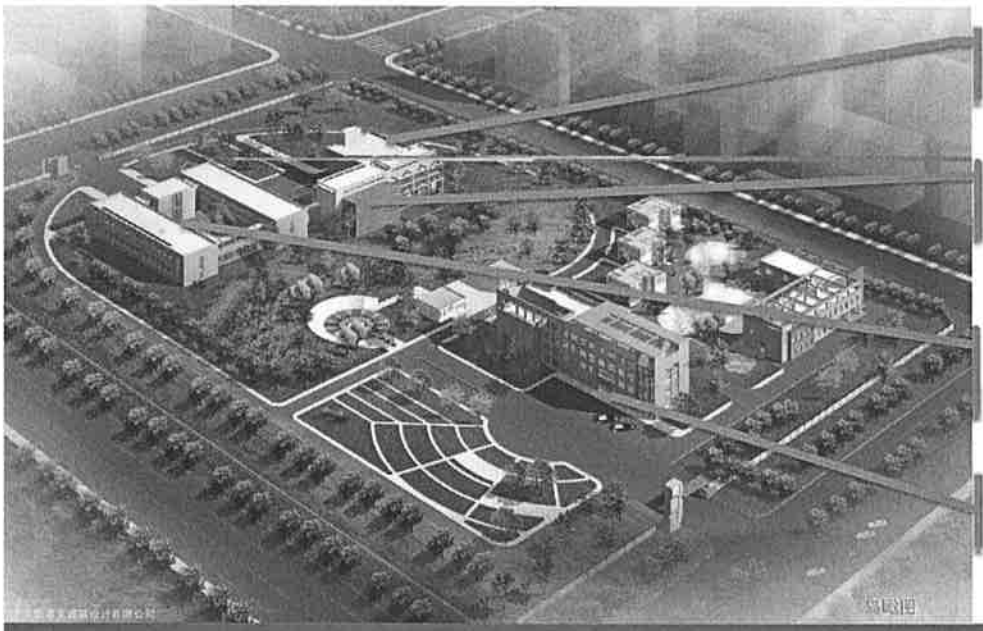
- **Under the support of the OIE Regional Representation for Asia and the Pacific (OIE RRAP), and in collaboration with National Veterinary Diagnostic Laboratory (NVDL; OIE Reference Laboratory for PRRS), China Animal Disease Control Center (CADC). The regional short-term training on swine disease control and diagnosis in Beijing in 2015-2018.**

China Animal Disease Control Center



Daxing Base of CADC

- Located in DaXing District, Biomedical Base, Daxing Base of CADC covers an area of 100 000 m^2 ,20 000m^2 building areas, cost 300 millions Yuan.



National Veterinary Diagnostic Center

On May 20- 25 , 2012, Veterinary Diagnostic laboratory(VDL) of CADC was designated as OIE Reference laboratory for Porcine Reproductive and Respiratory Syndrome （PRRS）.

OIE

Our Ref.: KM/DL 36.935 — 28 September 2011

Dr Zhang Zhongqiu
Director General
Ministry of Agriculture, Veterinary Bureau
No.11, Nongzhan Nanli Chaoyang District
100125, Beijing
CHINA (PEOPLE'S REP. OF)

Dear Dr Zhongqiu

Application for designation of OIE Reference Laboratories for Porcine reproductive and respiratory syndrome, and for Newcastle disease

The OIE Biological Standards Commission accepted your application for the designation of the Veterinary Diagnostic Laboratory, China Animal Disease Control Centre (CADC-VDL) as a new OIE Reference Laboratory for Porcine reproductive and respiratory syndrome, with Dr Kegong Tian as the designated OIE Reference Expert, and your application for the designation of the National Reference Laboratory as a new OIE Reference Laboratory for Newcastle disease, with Dr Zhifang Wang as the designated OIE Reference Expert.

In accordance with the Rules for OIE Reference Laboratories, the applications must also be endorsed by the OIE Council. All applications will then be submitted during the General Session in May 2012 for approval by the World Assembly of Delegates of the OIE, after which I will send you confirmation of the designation.

Thank you for your support of this important OIE programme. OIE Reference Laboratories provide an essential service to our Members. I look forward to working with Dr Tian and Dr Wang in the future.

Thank you for your continued support of the OIE.

With best regards,

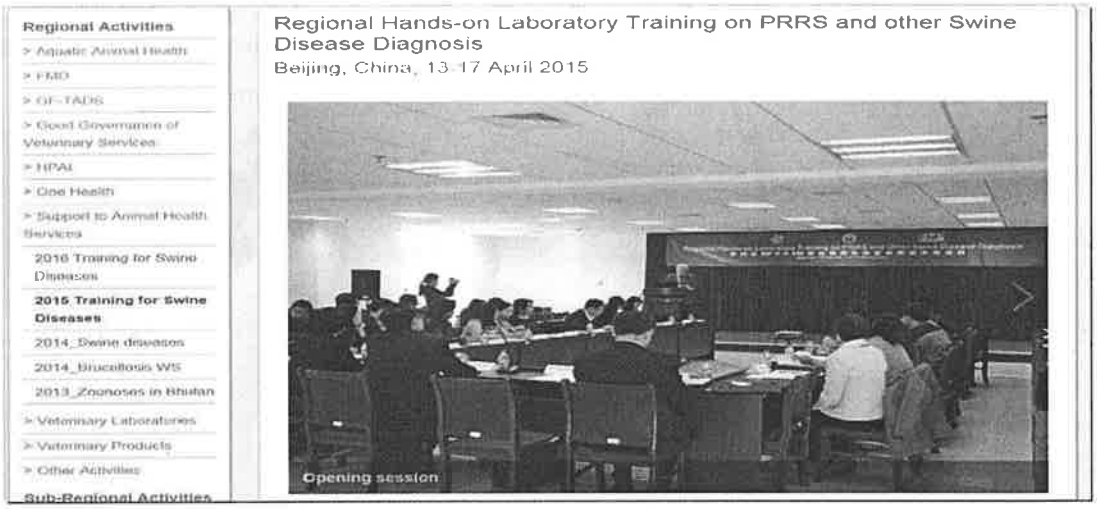
Yours sincerely

Dr Bernard Vallat
Director General

cc: Dr Kegong Tian, Dr Zhifang Wang

农业部兽医诊断中心
National Veterinary Diagnostic Center
Ministry of Agriculture,P.R. China

The regional short-term training on swine disease control and diagnosis in 2015-2018



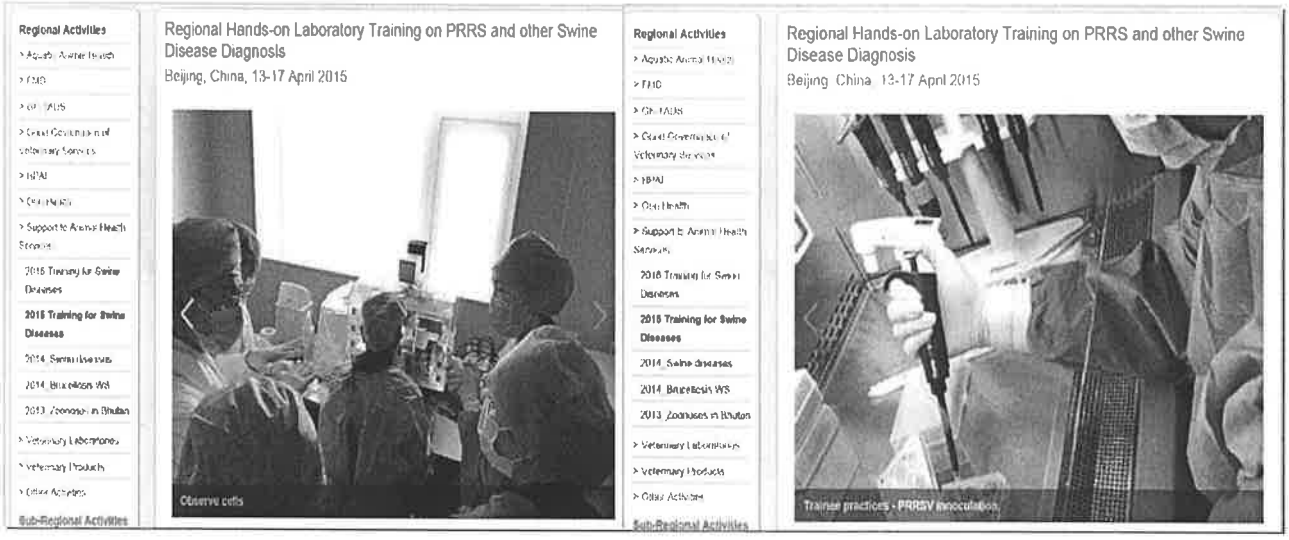
- **To enhance the trainees skills in swine viral disease laboratory diagnosis focusing on etiologic diagnosis, three times trainings are focus on the Regional Hands-on Laboratory Porcine Reproductive and Respiratory Syndrome (PRRS) and Other Swine Disease Diagnosis in National Veterinary Diagnostic laboratory of CADC from 2015-2017 .**

The regional short-term training on swine disease control and diagnosis in 2015-2018

Training contents:

- **1. Brief introduction national swine disease diagnostic systems and main constraints from (China, Cambodia, Mongolia, Indonesia, Laos, Myanmar, Philippines, Thailand and Vietnam)**
- **2. Country experience in emergency response**

The regional short-term training on swine disease control and diagnosis in 2015-2018



- **Hands-on training in NVDL-CADC: Instruction of cell culture (Marc-145) and cell passage, Virus infection and isolation for PRRSV and CSFV, and then the trainees hands-on experiences.**

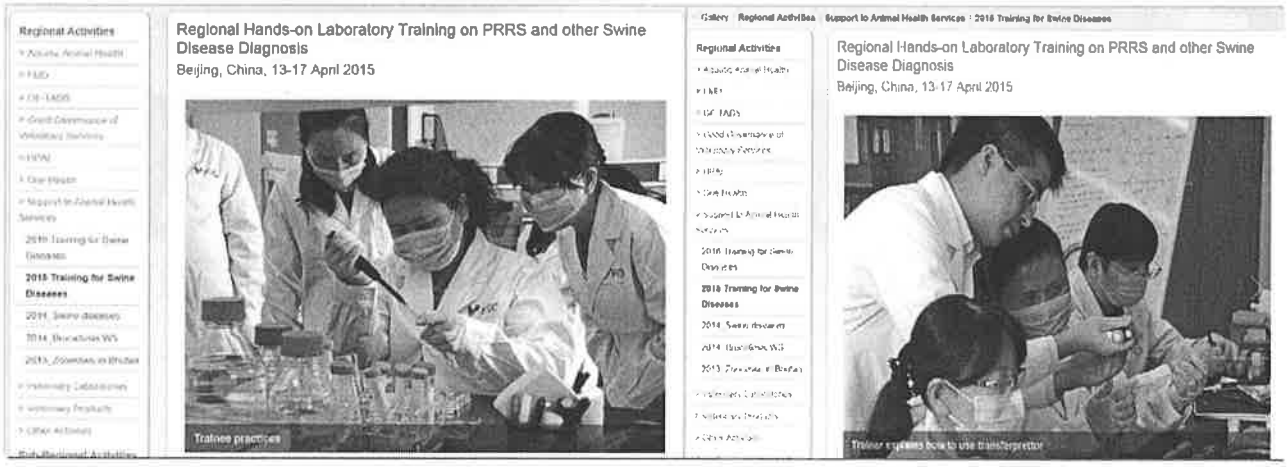
The regional short-term training on swine disease control and diagnosis in 2015-2018

- **Hands-on training in NVDL-CADC: Instruction of virus neutralisation test (VN) and TCID50 for PRRSV and CSFV, and then the trainees hands-on experiences.**

The regional short-term training on swine disease control and diagnosis in 2015-2018

Hands-on training in NVDL-CADC: Instruction of fluorescent antibody test (FAT), immunoperoxidase monolayer assay (IPMA) for PRRSV and CSFV, and then the trainees hands-on experiences.

The regional short-term training on swine disease control and diagnosis in 2015-2018

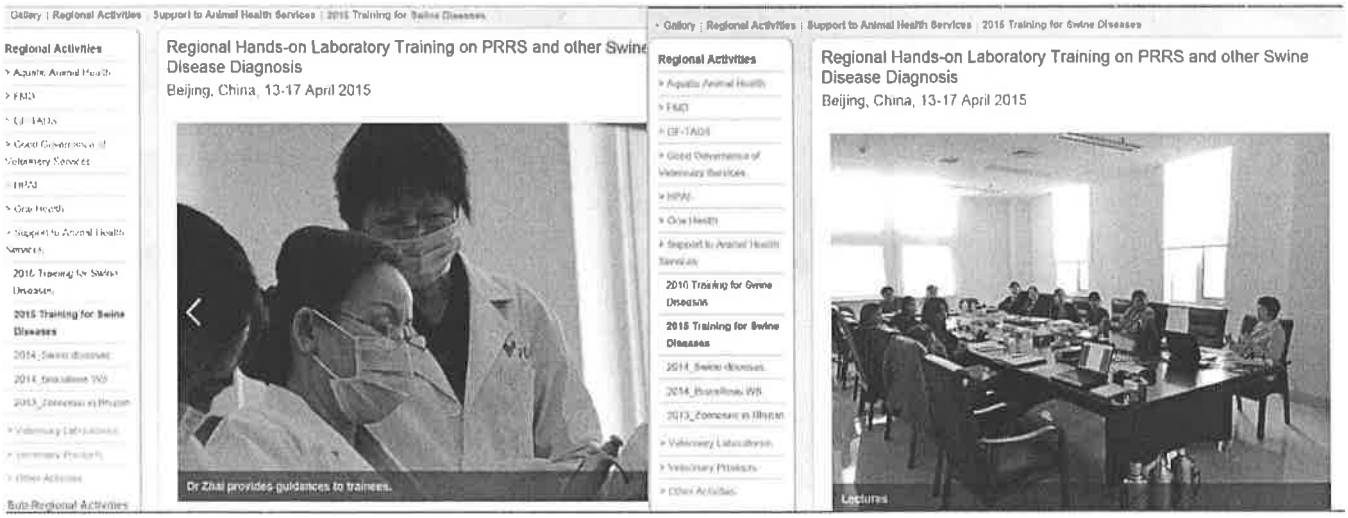


- **Hands-on training in NVDL-CADC: Instruction of real-time RT-PCR for PRRSV/FMDV/PEDV and ELISA for PRRSV/FMDV/CSFV, and then the trainees hands-on experiences.**

The regional short-term training on swine disease control and diagnosis in 2015-2018

- **Hands-on training in NVDL-CADC: Instruction of digital PCR for PRRSV, and then the trainee hands-on experiences.**

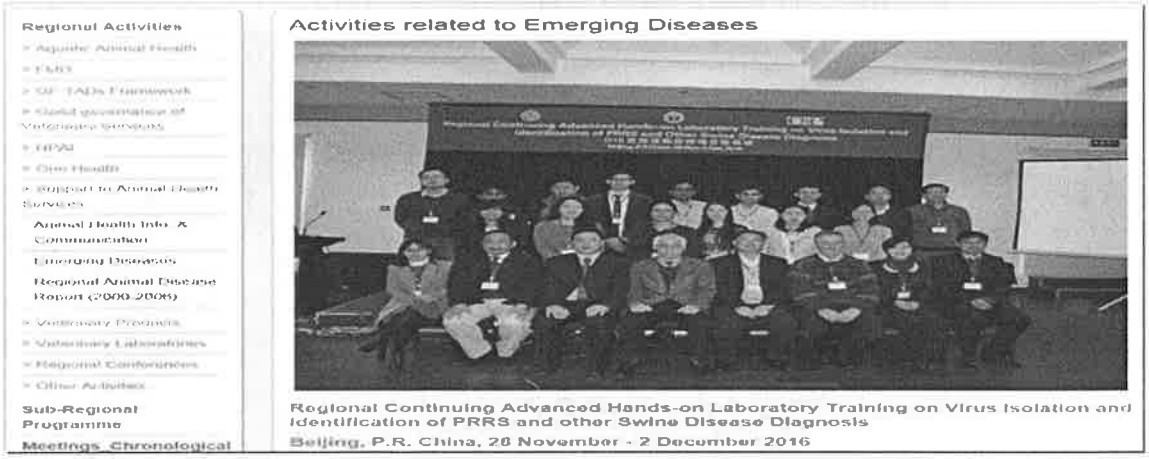
The regional short-term training on swine disease control and diagnosis in 2015-2018



Communication and discussion

- **Group discussion: How way forward to improve disease control and diagnosis capacity**
- **Coordination for laboratory and epidemiology: what are needed to be shared/coordinated between Lab and Epi part**

The regional short-term training on swine disease control and diagnosis in 2015-2018



Risk management of high-level bio-safety laboratory, evaluation of the diagnostic reagent kits as well as quality control of diagnostic result (Dr Chris Morrissy, AHHL, Australia)

- **To promote further understanding of OIE standards on veterinary laboratory work, some experts are invited to provide disease diagnosis, epidemiological analysis and bio-risk management.**

The regional short-term training on swine disease control and diagnosis in 2015-2018


Regional Short-term Training on Swine Disease Control and Diagnosis in Beijing, PR China, 30 July – 3 August 2018

Swine disease diagnosis including:

Clinical signs of major swine disease and case study,
Sample collection, packaging and shipping,
General principles in diagnosis of clinical disease and in surveillance,
Test methods recommended for swine disease outbreak investigation and for surveillance,
Analysis and interpretation of the diagnostic tests. Significance of false positive and false negative results,
The diagnosis of emerging and unknown swine diseases.

(Dr Trevor Drew OIE Reference Expert for CSF and BVD)

The regional short-term training on swine disease control and diagnosis in 2015-2018

Regional Short-term Training on Swine Disease Control and Diagnosis in Beijing, PR China, 30 July – 3 August 2018

African Swine Fever:
The ASF epidemiology, early detection and prevention
ASF diagnosis and control measures,
Socio-economic impact of ASF outbreak

(Dr Vittorio Guberti, Institute for Environmental Protection and Research (ISPRA))

Objectives and suggestions

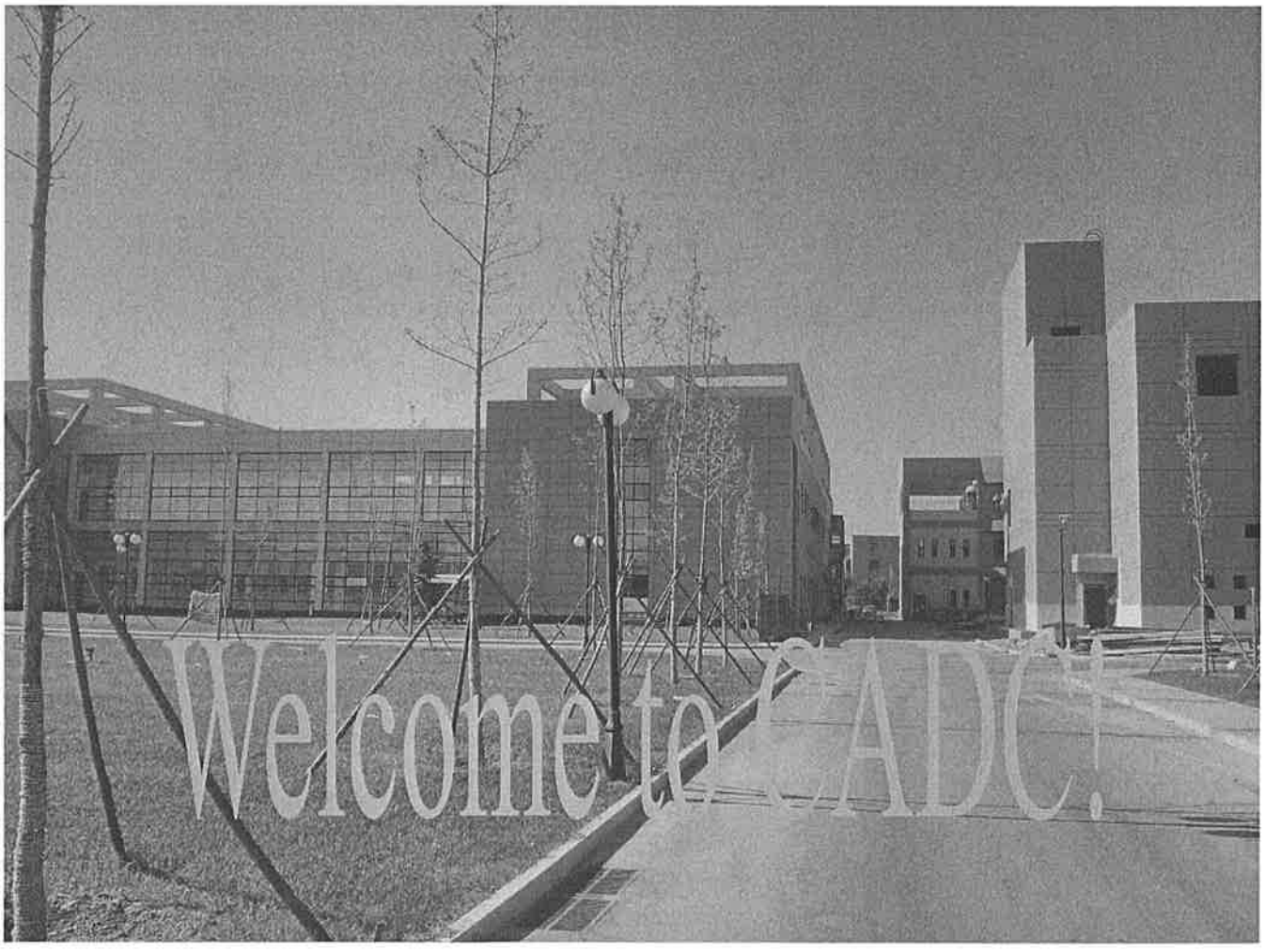
The objectives of the training were to provide the trainees with opportunities:

- **1. to enhance their skills in swine viral disease laboratory diagnosis focusing on etiologic diagnosis;**
- **2. to improve the knowledge about establishing new detective method, evaluating and choosing diagnostic reagent kits in clinical application as well as quality control of diagnostic result;**
- **3. to promote further understanding of OIE standards on veterinary laboratory work, including specimen handling and bio-risk management; and**
- **4. to allow experience sharing and to facilitate cooperation between participating countries.**

Objectives and suggestions

The suggestions of the training from the trainees:

- 1. Clinical diagnosis and sample collection for swine diseases.
- 2. Communication and coordination for laboratory and epidemiology: what are needed to be shared/coordinated between Lab and Epi part.
- 3. way forward to improve regional disease control and diagnosis capacity.
- More experts are invited to introduce the success cases of siwne disease prevention, control and clear.



European pig industry context.

EUROPEAN PIG INDUSTRY

1986 -1999 – European Nordic countries ban antimicrobial (AM) use as growth promotor.

2006 – European Union (EU) **ban antimicrobial (AM)** use as growth promotor.

2010 – Denmark **(the industry)** stablish the "Yellow Card" system → They reduce 10% of the use each year.

2011 – EU: "*Action plan against* the rising threats from *Antimicrobial Resistance*"

2013 – EU: EIP-AGRI group (Agricultural European Innovation Partnership). Focus group in Antimicrobial reduction.

2016 – EU. A European One Health Action Plan against Antimicrobial Resistance

Since 2014-2017 – Private companies engage to reduce antimicrobial use all across the EU.

At the same time European countries develop more restrictive legislation.

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GF-TADs
GLOBAL FRAMEWORK FOR THE PROGRESSIVE CONTROL OF TRANSBOUNDARY ANIMAL DISEASES

Food and Agriculture Organization of the United Nations

oie

DEPARTMENT OF AGRICULTURE 1898

"Strategies to improve the use of Antimicrobials in the pig industry"

Juan Hernandez-Garcia
EBVS® veterinary specialist in Pig Health Management
Department of Veterinary Medicine, University of Cambridge
Thinkinpig – Swine Consulting
juanhernandezvet@gmail.com

Third Regional Workshop on Swine Disease Control in Asia

CEBU, The Philippines. 2nd October 2018

What AM have represented for the pig industry?

- The use of antimicrobials has been **advantageous for pig producers** for decades.
  - Lots of producers used it as another **input like additives** or disinfectant.
  - Some producers required AM to **keep competitiveness.**
  - **Lack of awareness** about AM use – **lack of interest to reduce** AM use.
- **Good ROI** (Return Of Investment)
  - It **outmatched** other ways to fix problems (better management, facilities, additives)
    - Inhibited investment in alternative options.
    - Inhibited/delayed research
    - Prevented the implementation of alternative products due to lower ROI (or lower efficacy).
  - **Negligent practices** are fixed by using antimicrobials.

My role in the Pig-world.

- Veterinarian (Zaragoza, Spain, 2008) - - Continuous specialized training in pig medicine and pig nutrition.
- 12 years working in the pig industry.
- I was a farmer, then field veterinarian, then R&D technician in pig medicine and nutrition and consultancy.
- Last years I worked mostly in R&D in **diagnostic tools** and antimicrobial resistance (AMR) in S.suis (Cambridge).

Currently work: **Transference of technology.** Link between the industry (Spain, UK) and academia (UK).
- Working on Public Health (Asia and Europe)
- S.suis (lab research and field cases)
- Looking for **reducing AMR** by **improving antimicrobial use** in different systems
- Training vets and farmers

My approach to the AMR problem: Point of view scientific (diagnostics) -- technical (production and public health)
1. Improve diagnostic work
2. Adapt prevention programs to avoid/reduce disease impact
3. Use alternatives to treat
4. Is using antimicrobials, do the diagnostic work to better select them

DISCLAIMER: This presentation does not represent the antimicrobial misuse or wrong practices done in any country. It is a mixture of observations occurring in different countries.

AM USE REDUCTION EXPERIENCES FROM EUROPE

A question of **motivation**... (more money and legislation with punitive sanctions helped).

- Lots of producers **halved antimicrobial** consumption.
- Companies created **antimicrobial-free production flow** (sold in special markets).
- They managed to perform **equal or better with less** molecules, less quantities and more restrictions.

New opportunities for **alternative commercial products and vaccines**;

INVESTMENTS in research , safety and approval tests, marketing and field trials.

WHAT THESE COMPANIES DID ?
HOW TO ADAPT TO OTHER PRODUCTION SYSTEMS ?

CASUES OF WRONG ANTIMICROBIAL USE

Not only in developing but also in the most developed countries.

1. Treating even when the **number of affected** pigs does not justify the treatment
2. **Misuse of antimicrobials** in early stages lead to increased use in later stages
   - Dysbiosis – i.e. *Salmonella* after beta-lactamic treatment in weaners.
   - Lack of proper immunity experience prior to challenge – i.e. *Strep. suis*
3. **Underdosing.** Dosing less (time or quantity). Use of counterfeit diluted products
4. **Management deficiencies** increasing consumption
5. **"Masked use"** or genuine-involuntary use as **growth promotors**
   - Antimicrobial "pulse" treatments without diagnostic work or preventive measures
   - "Glasser´s paradox" – questionable reasons to justify treatments
6. **Optimization of the system** led to increased antimicrobial use in lots of companies

First steps in interventions

Approach actuating in different levels.

1. Removing ANTIMCROBIALS from feed
2. Reconsidering necessity of treatments – Do diagnostic work
3. Enhancing individual pig care

MAXIMIZING PRODUCTIVE (ECONOMIC) PERFORMANCE

Multiple solutions to optimize a production system – different in each scenario

Lots of optimized production systems can **be far away from the best optimal** solution.

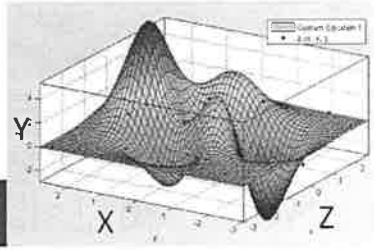
REASON 1. Antimicrobials **costs are low** comparing with their benefits.

REASON 2. Many **variables** and too **many scenarios**.

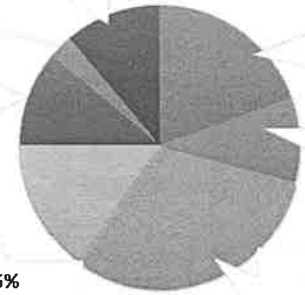
REASON 3. We **still need to understand** lots of things (i.e. immunity and nutrition).

COULD THE BEST SOLUTION BE IN A LOW ANTIMICROBIAL USE AREA?

Yes, we can produce even betters with less antimicrobials.



Survey to 100 Pig Vets in Spain: Which 3 aspects help you to reduce antimicrobial consumption? (A. Vela and F. Illes, 2018)



Legislation and Official Inspections 3%

Vaccine and autogenous vaccines 11%

- **Welfare, management and housing 19%**
  - Reduce overcrowding
  - Ventilation
  - Quarentine
  - Heating at growing phase
  - Improve farm isolation
  - Kill not competitive pigs
  - Control census and pig flow

- **Farmers awareness, preparedness and training 11%**
  - Biosecurity
  - Ventilation
  - Diagnostics
  - Hygiene
  - Motivation

Biosecurity 10%
-Avoid commingling sources.
-Vehicles controla dn hygiene.
-All in all out
-Hygiene in the farm
-Dying time after cleaning.

- **Diagnostics and treatments 15%**
  - Better diagnostics
  - Monitor diagnostics
  - M.hyo eradication
  - Early diagnostics
  - Digestive process refined diagnostics
  - Diagnostics kits
  - Antimicrobial resistance test

- **Feed and water quality 31%**
  - Feed quality. Feed ingredients quality
  - Feed more adapted to each pig age
  - Improve post-weaning feeding
  - Feed additives
  - Acidification
  - Water quality

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Grup Batallé ® experience

- Consistent reductions each year since 2015

➨ Spain 2015: 402 mg/CPU

➨ Group Batallé 2015: 340 mg/CPU

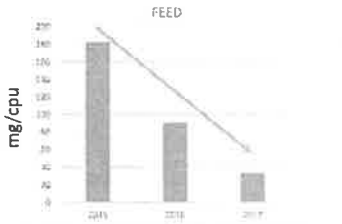
40%

➨ Group Batallé 2016: 205 mg/CPU

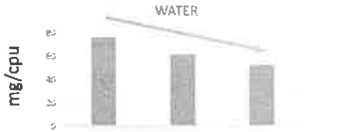
44%

➨ Group Batallé 2017: 115 mg/CPU

***Material courtesy of F. Illes and Group Batallé 2018**



➨ Feed: "preventive" treatments



➨ Water: Metaphilactic treatments.

➨ Injected: Individual treatments

9

ALTERNATIVES TO REDUCE ANTIMICROBIALS USE ACROSS EU

1. BIOSECURITY AND HEALTH STATUS
2. DIAGNOSTICS AND BETTER ANTIMICROBIAL CHOICE
3. VACCINES AND AUTOVACCINES
4. INPUTS QUALITY (FEED, WATER...) AND IMPROVEMENTS
5. WELFARE AND HOUSING
6. TRAINING (farmers and vets)

DIFFERENT STRATEGIES WERE CHOSEN IN DIFFERENT SCENARIOS // COUNTRIES.

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IN WHICH PRODUCTIVE STAGE WAS IT REDUCED ?

- The actuation occurred in different point and in different ways.

	2015			2017		
	% of the total AM use	Feed	Water	% of the total AM use	Feed	Water
Sows	20	100	0	10	0	100
Nurseries (8-30kg)	35	77	23	35	77	23
Growers (30-115)	45	55	45	55	0	100

- FROM 340 mg/CPU in 2015 .... To ..... 115 mg/CPU in 2017.
- In feed medication just in weaners (reason: *S.suis* causing meningitis).
- 80% of in-water antimicrobials is for growers
- Ongoing eradication programmes (i.e.*Mycoplasma hyopneumoniae)* to reduce AM use even more.

*Not considering individual treatments

***Material courtesy of F. Illes and Grup Batallé 2018**

10

THINKING AHEAD: Improvements in diagnosis.

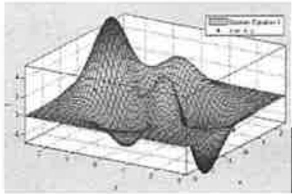
1. CHARACTERIZATION of typical PATHOGENS and AMR in PIG FLOWS.
2. IMPROVING MONITORING STRATEGIES TO SELECT ANTIMICROBIALS
3. DEVELOPMENT OF MOLECULAR TOOLS TO DIAGNOSE RESISTANCES (BY PCR OR SEQUENCING).

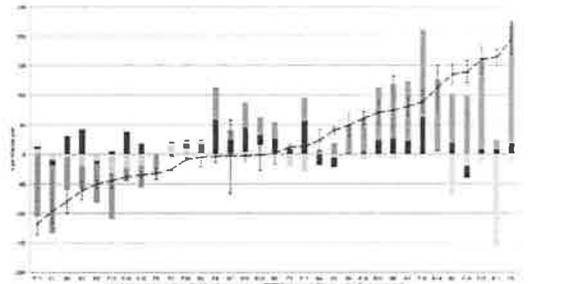
MINAPIG PROJECT: REDUCING AB CONSUMPTION WHILE INCREASING PERFORMANCE

(Collineau et al. 2017)

Number of dosis per pig (day 0 to d200) at slaughter age decreased from 244 to 129 dosis (68 farms in BEL-FRA-GER-SWE).

This reduced AB cost in 0.4 €/pig whitout any production drop.





CHARACTERIZATION OF AMR IN A PIG FLOW

OBJECTIVE:

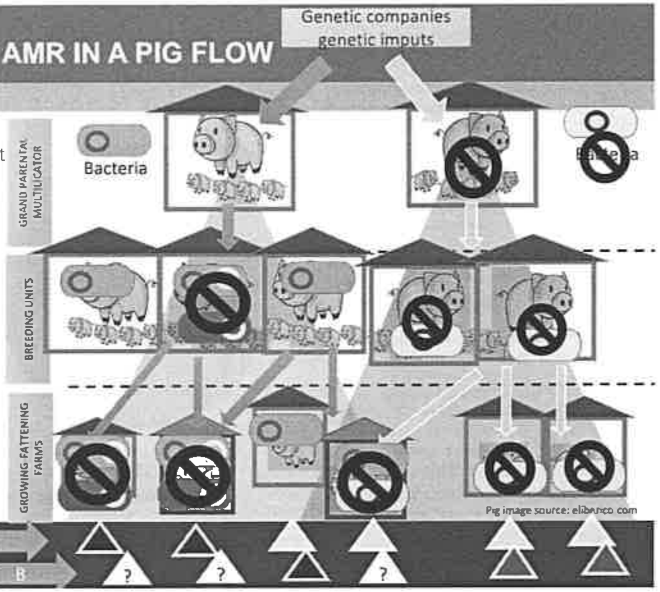
- **Predict** type of agent, AMR and treatment outcomes in every outbreak on a productive pyramid.

REQUERIMENTS

- Neat fixed **organized pig flows**
- Try to **avoid mix** sources
- **All-in all-out** whenever possible
- Biosecurity

METHODS

- **Isolate key pathogens** in the different levels of the pyramid.
- **Identify susceptibility** patterns.
- Involved pathogens and **challenge timing**

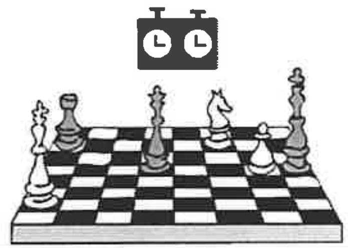


WHICH SHOULD BE THE PREDOMINAT ROLE OF A PIG VET?

"Fireman"
Fix problems.
Late to prevent.

"Advisor"
Update and train to prevent expected problems

"Chess players"
Deep evaluation.
Think in the next steps and be ready to quickly act in any situation.



Images from colourbox.com, getdrawings.com, pngtree.com and vexe.le.com

MIC patterns changes on time on Strep suis.

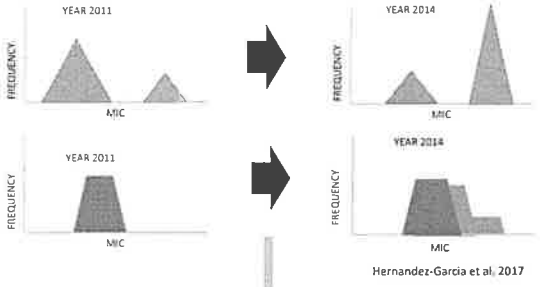
PHENOTYPIC CHANGE ON TIME

MIC CREEP OVER TIME.

PHENOTYPIC DIFFERENCES BETWEEN CLUSTER

ACCUMULATION OF AMRs

- Statistical association of certain combinations.



Hernandez-Garcia et al, 2017

Genomic features explaining these associations

50% of isolates with combined NWT for

- macrolides
- lincosamides
- tetracyclines
- fluoroquinolones

IMPROVEMENTS IN DIANGOSTIC SYSTEMS

MALDI-TOF MS technics to detect AMR

PCR and SEQUENCING TOOLS TO IMPROVE MONITORING STRATEGIES

Detect genes conferring resistance → **Quicker than culture** – (Reduce the 3 day feed-back gap).

IMPROVEMENT OF FEED BACK

Make a better use of inhibition quantitative information

Include phenotypic information derived from ECOFF (epidemiological cut-off values)

Re-consider current **Clinical Breakpoints** and **real meaning to set a prudent AM treatment**

TAKE HOME MESSAGE

Producers need a **real motivation** to reduce antimicrobial consumption

Otherwise they **cannot jeopardize** their production performance.

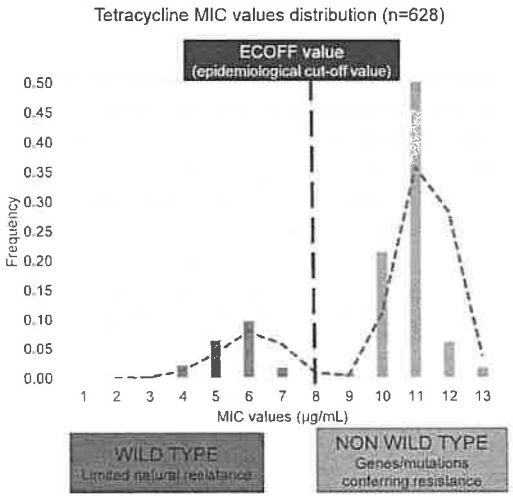
Experiences from EU producers **show different ways to achieve** reductions in AMR

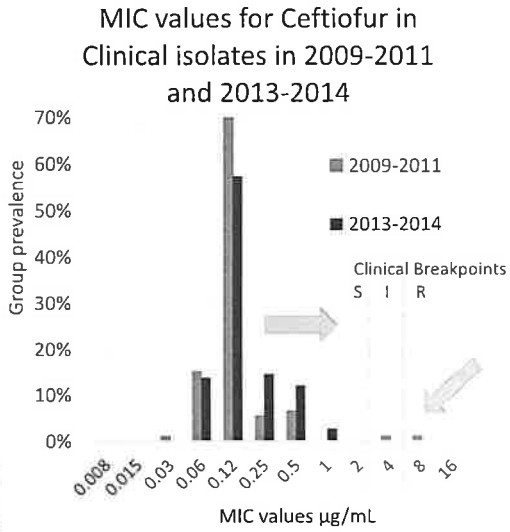
A wide **range of new products** and management technics will be available in the next years (+ instructions to make an efficient use)

Legislation would be required to reduce AMR in combination with an adequate enforcement

Small producers could represent a problem to control antimicrobial use, though they **may be not contributing** to the problem as much as commercial intensive farms.

CLINCIAL BREAKPOINTS VS ECOFF





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THANKS FOR YOUR ATTENTION.

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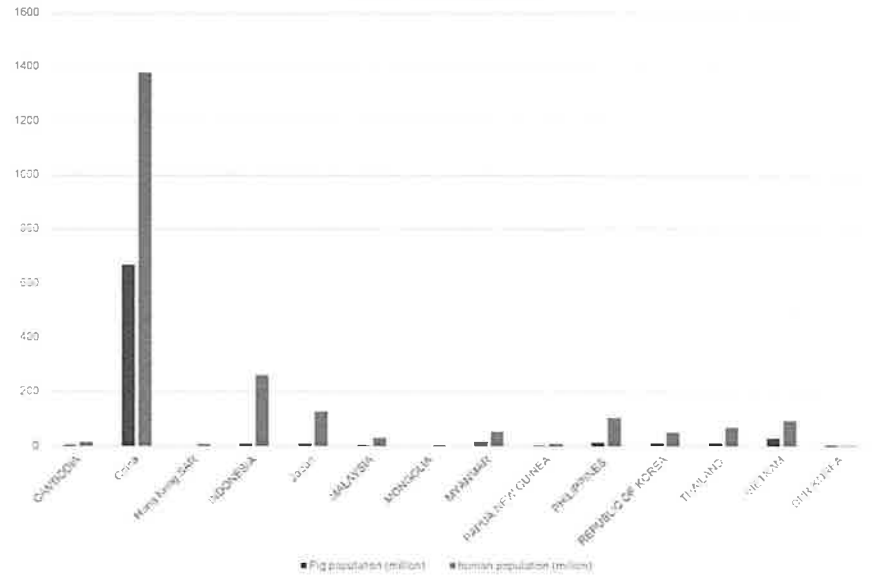
Regional Project Coordinator

Swine in Asia

Human vs pig population

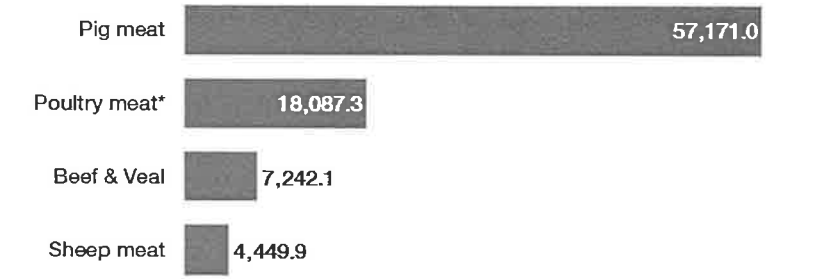


China is the world's largest food producer as well as the largest food consumer

Meat consumption in China

Total consumption by type in tonnes, 2014

WORLD ECONOMIC FORUM



Source: OECD-FAO Agricultural Outlook 2015-2024

*Poultrymeat measured in ready to cook weight, all others in carcass weight equivalent.

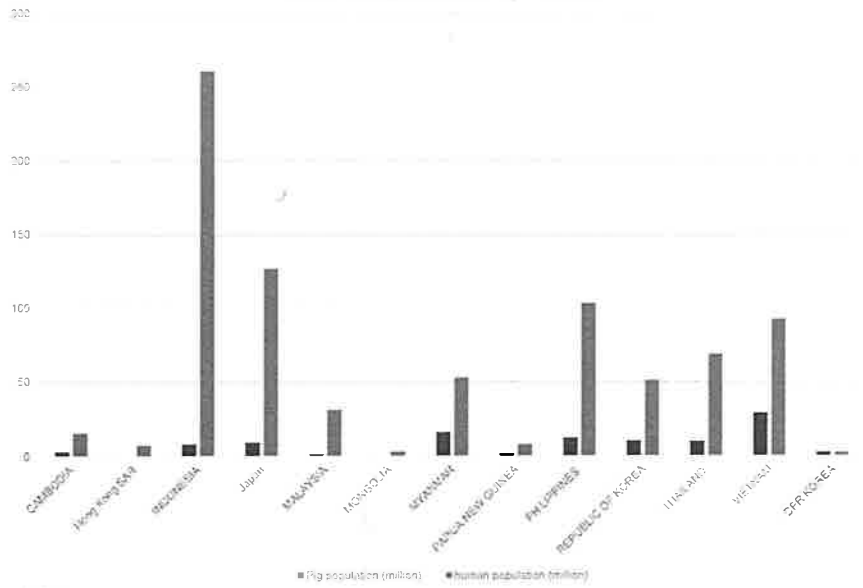
Pork Consumption in China

- In 1997 pork consumption per capita was 22.4kg
- In 2017 pork consumption has risen to 30.8kg pork per capita

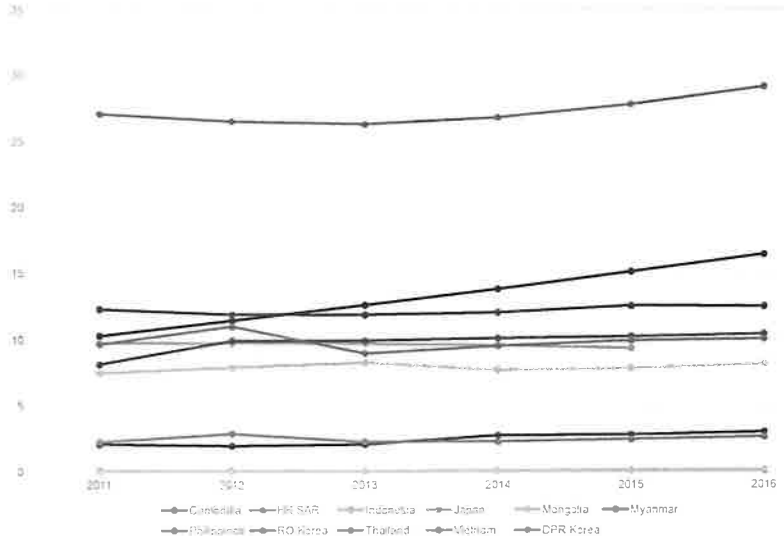
Some factors that may impact supply and demand for food in general in Asia

- **Increasing demand for foods of premium quality**, particularly high protein food. Increased disposable income coupled with smaller family sizes and education about nutrition leads to increased demand for foods of premium quality.
- **Changes in supply chains**. More advanced supply chains have made foods available in locations and at times that would have otherwise not been possible, particularly perishable foods. This also affects the quantity of food consumed.
- **Rural migration and urbanisation**. Each year a large number of rural people move into the urban system, which results in changes in where foods are consumed. Composition of food consumption and manners of consumption (e.g., methods of cooking) are changing.
- **The tastes of younger consumers**. Younger generations, with more exposure to foreign cultures, tend to be more prepared to try foreign foods and the food consumption styles of other cultures. Everywhere is becoming more globalized.

Human vs pig population (excl. PR China)



domestic pig population in Asia (excl. PR China



Backyard Pig Farming

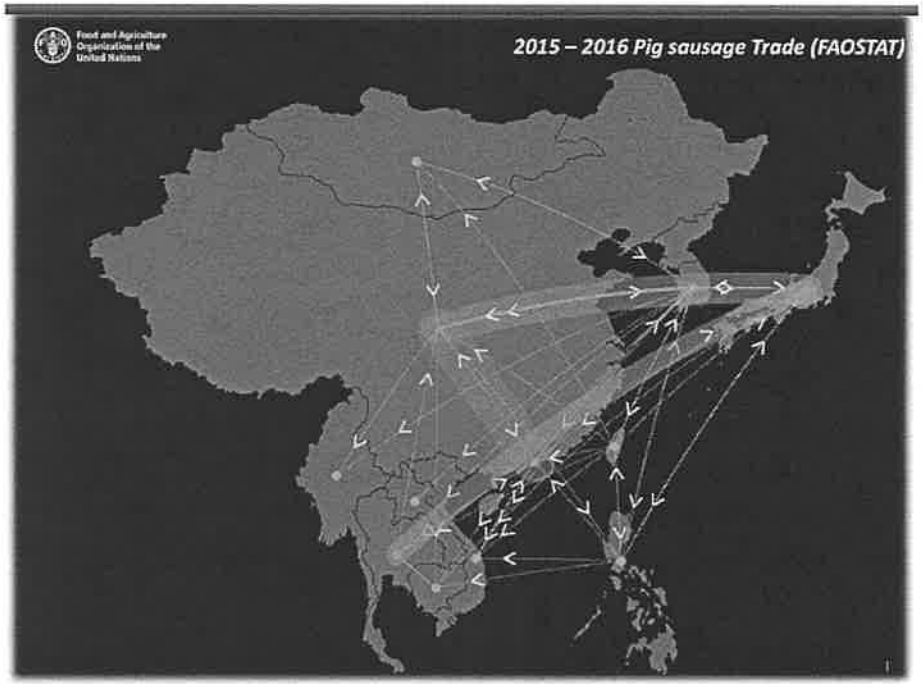
Region	Percentage	2014	2017
EA	>70%	1	0
	40%-70%	1	2
	20%-40%	0	1
	0 - 20%	3	3
SEA	>70%	4	4
	40%-70%	2	1
	20%-40%	1	2
	0 - 20%	1	2

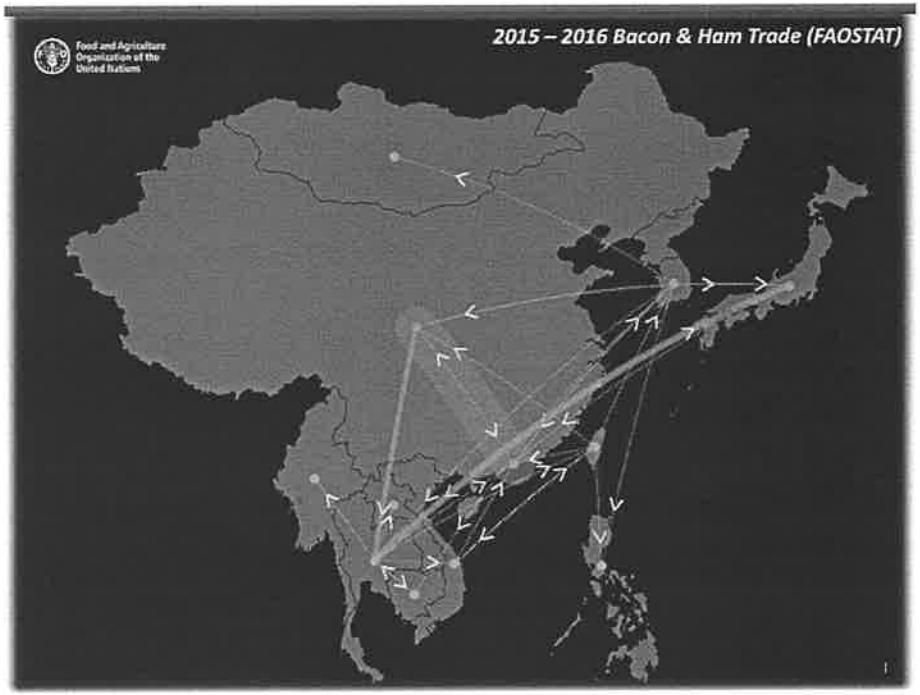
Reports:13 – 2014, 15 - 2017

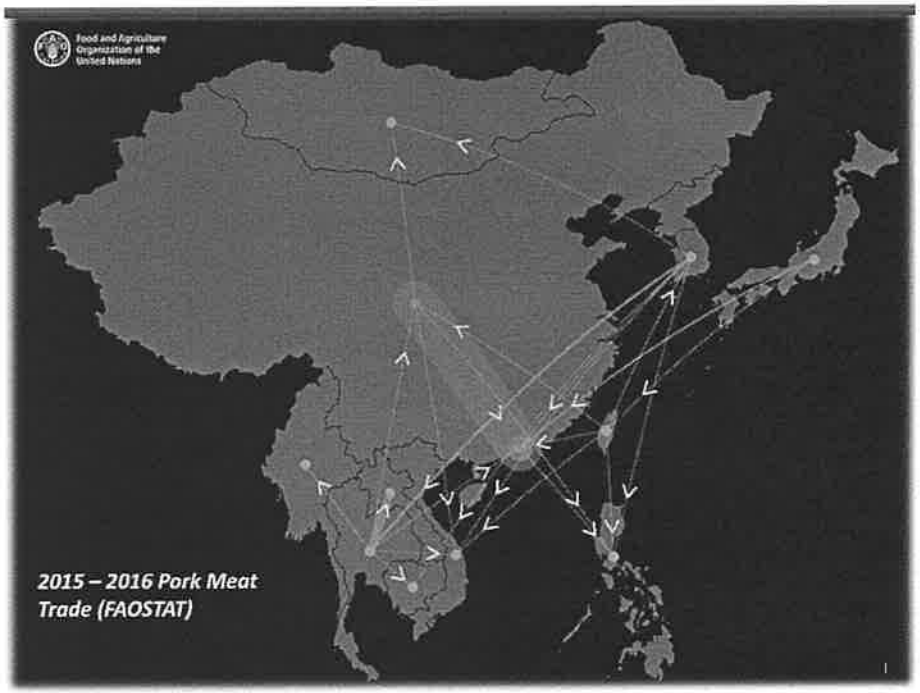
Estimated cost of pig meat & live pig

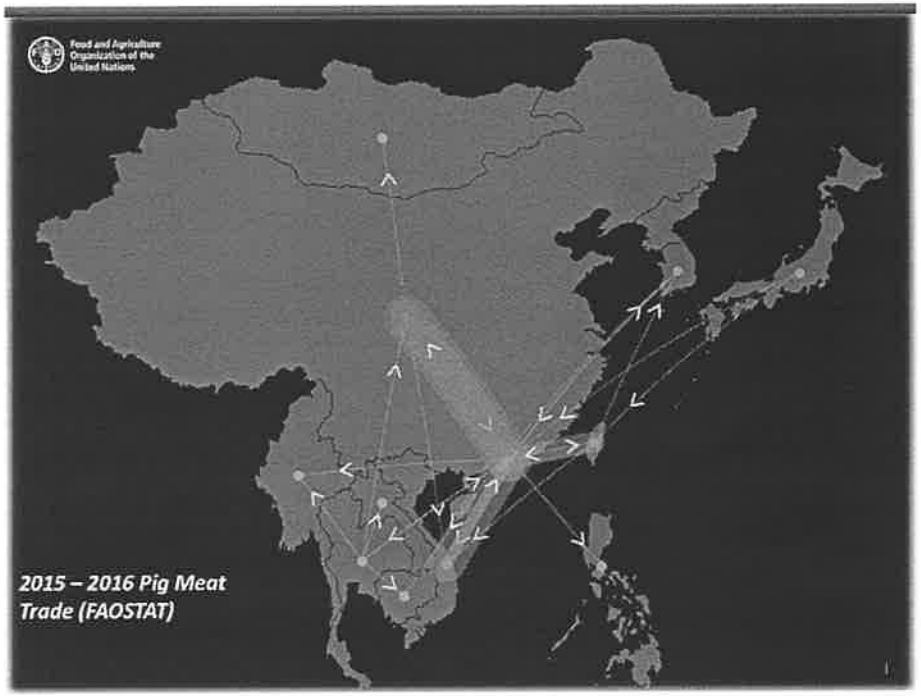
Country	Pig Meat / kg US$	Live pig / kg US$	1 bottle of domestic beer 0.5L in US$
Cambodia	4.0	1.3	0.60
China PR	3.0	2.1	1.5
Hong Kong SAR	2.0	3.0	2.0
Indonesia	7.0	3.0	2.1
Japan	20.0	37.0	2.4
DPR Korea	1.51	0.8	1.0
RO Korea	13.0	?	1.0
Malaysia	3.9	2.02	2.7
Mongolia	2.5 – 3	2.0	1.5
Nepal	3.5	2.5	2
Papua New Guinea	20.0	40.0	10.0
Philippines	3.0	1.0	1.0
Singapore	8.5	N/A	3.9
Thailand	3.55	1.75	1.65
Vietnam	1.8 – 2.0	1.3	0.60

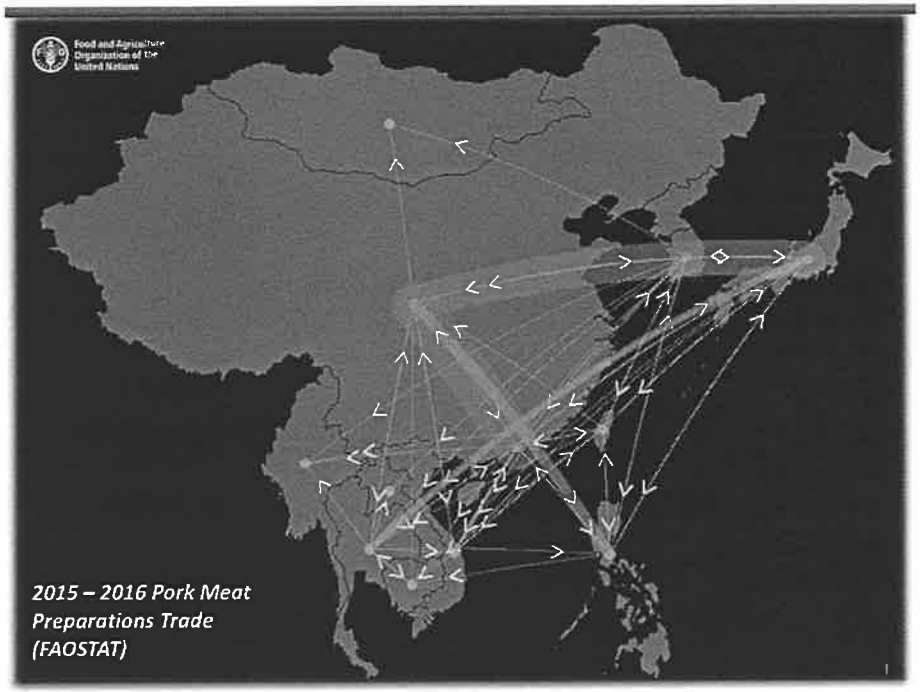
Pork/Pig Trade in Asia

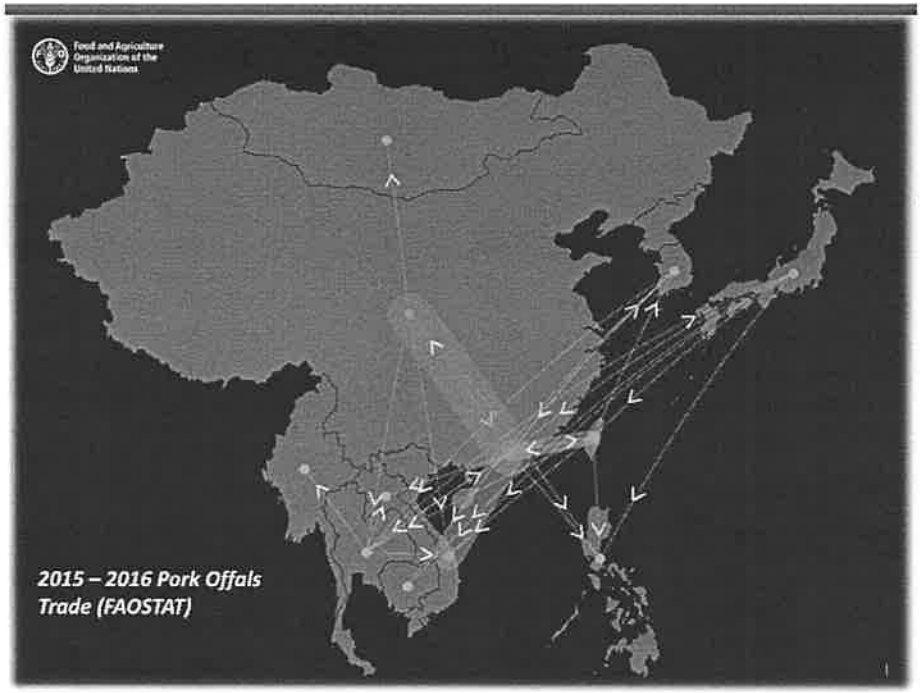



Food and Agriculture Organization of the United Nations
2015 – 2016 Bacon & Ham Trade (FAOSTAT)


Food and Agriculture Organization of the United Nations
2015 – 2016 Pork Meat Trade (FAOSTAT)


Food and Agriculture Organization of the United Nations
2015 – 2016 Pig Meat Trade (FAOSTAT)

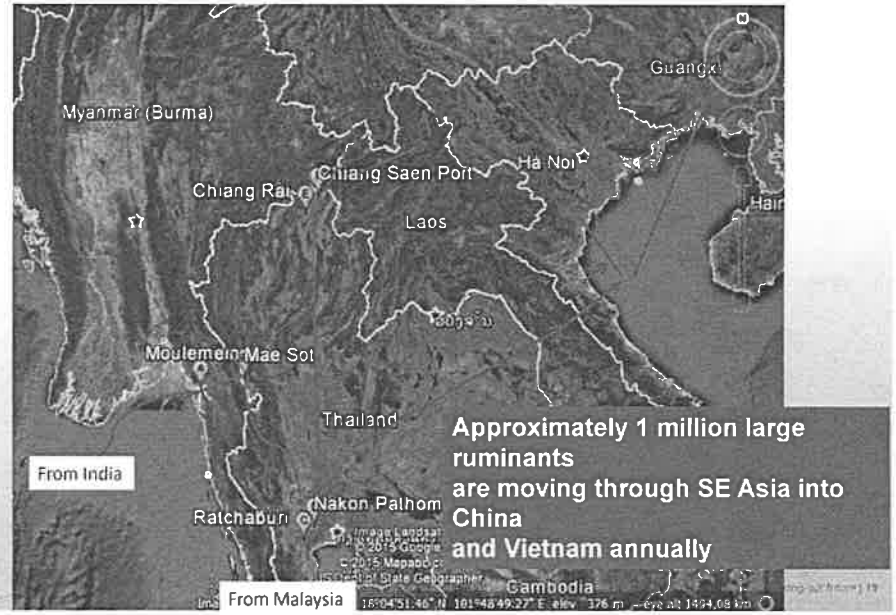

Food and Agriculture Organization of the United Nations
2015 – 2016 Pork Meat Preparations Trade (FAOSTAT)



Perceived Risk Pathways

- Live pig trade was by far the **no 1**. identified risk pathway in countries surveyed
- Poor Biosecurity was the most commonly identified challenge to controlling swine diseases, particularly in backyard farming systems.
- Others listed included lack of trust in government, poor understanding of disease at community level and swill feeding

Regional Animal Movement Study, 2015

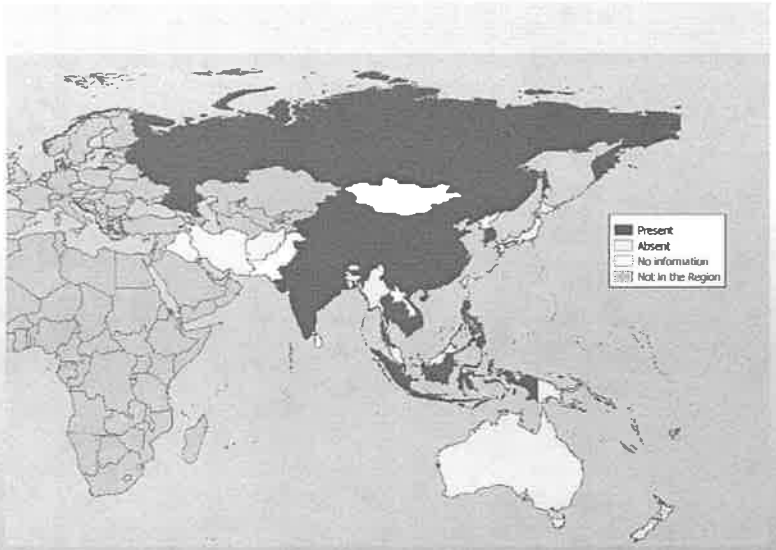


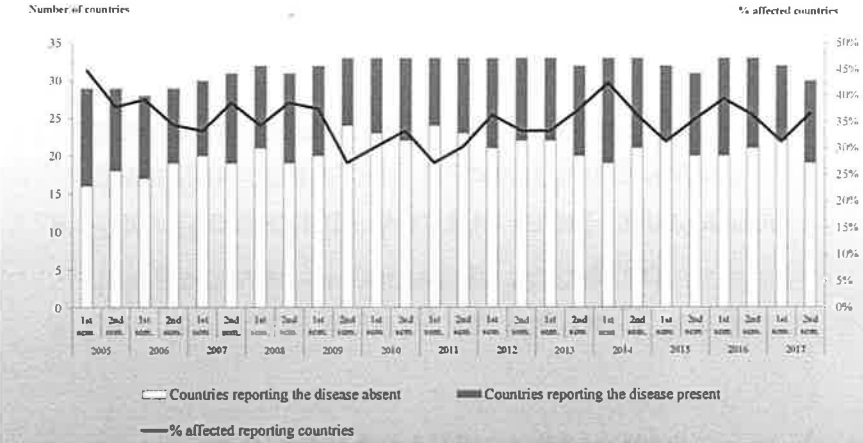
Independant Studies

There are very limited extensive studies focusing on trends in swine diseases and value chains in the greater region of Asia, however from a literature review of studies at local and national level, some common themes can be found:

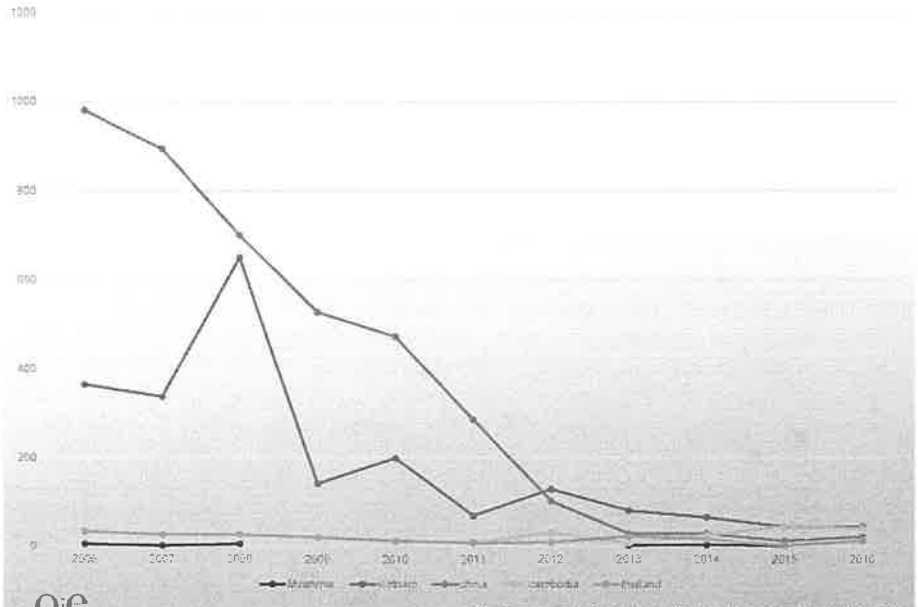
- Swine diseases are underreported compared with other production animals in many countries.
- Up to 80% of small hold farmers treat diseased pigs themselves and either do not seek or do not have access to veterinary services.
- Farmers are less inclined to report disease outbreaks and deaths where they have experienced destruction of animals, no compensation and movement restrictions put in place.

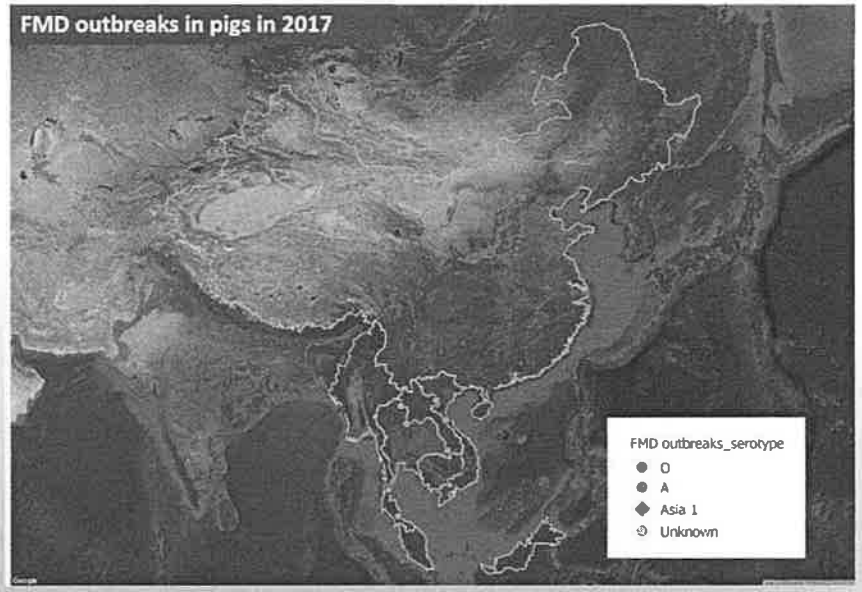
Disease Reporting





Reported outbreaks of Classical Swine Fever





Conclusions

- The human and animal population and distribution is changing
- Food consumption habits are changing
- Supply chains are more complex and global
- Value chains and markets across Asia are also complex and need to be better understood.
- Swine diseases are still under reported

Acknowledgements: Yu Qiu, Jing Wang, Ronello Abila, Lushi Liu, Guo Fusheng

Damian Tago Pacheco, Ian Dacre

Risk Assessment

- Hazard Identification
- Release Assessment
  - Risk factors involved
- Exposure Assessment
- Consequence Assessment

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TRANS-BOUNDARY PIG MOVEMENTS IN SE-ASIA

Ronello Abila
Sub-Regional Representative for South-East Asia

Hazard Identification

- Foot and Mouth Disease (FMD)
- Classical Swine Fever (CSF)
- Hypervirulent PRRS
- Porcine Epidemic Diarrhea (PED
- African Swine Fever ASF)

OIE Risk Analysis Framework

Role of animal movement

Release Assessment

Infected Animal purchased

↓

- Undetected at Trader's Holding Yard
- Undetected at slaughterhouse

↓

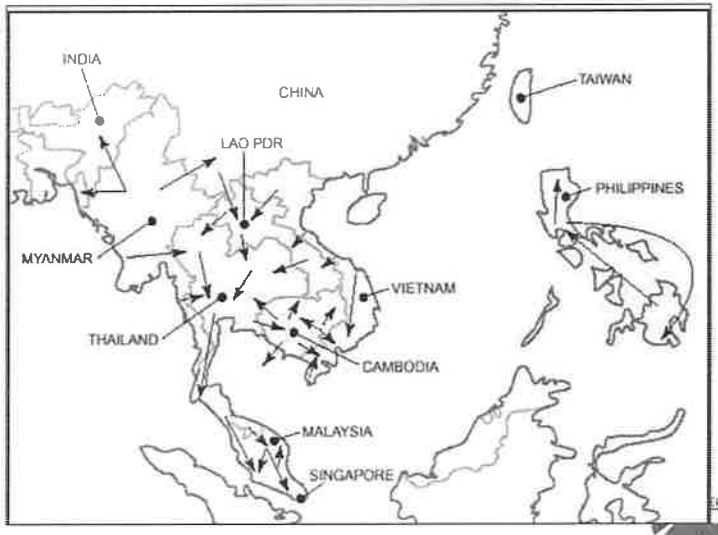
Cross-border trade

↓

Infect susceptible animals at destination

- Risks of having infected animals is high at the height of outbreak
- Prevalence is high during increase movement due festivals (Tet Festivals)

Animal movement (1998)



Exposure Assessment

Entry of Infected Animal or animal products (pork)

↓

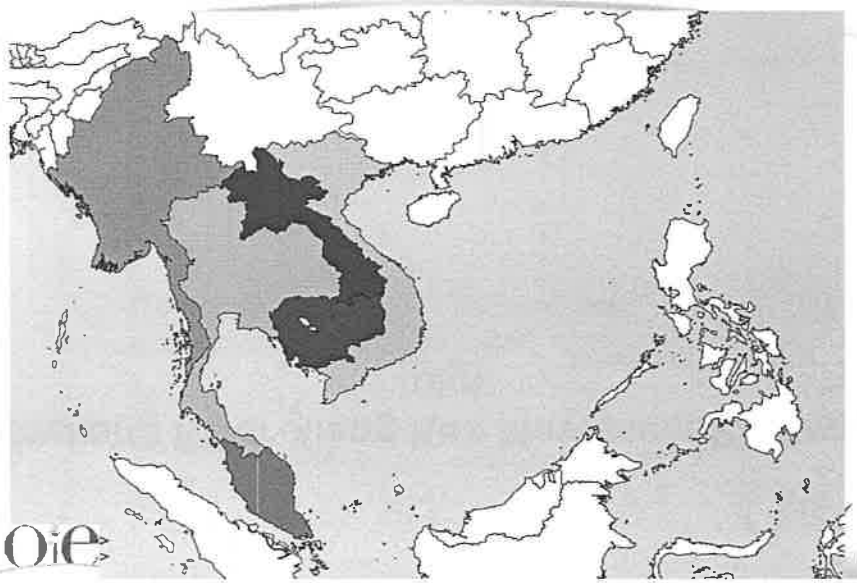
Exposure of local susceptible animal

↓

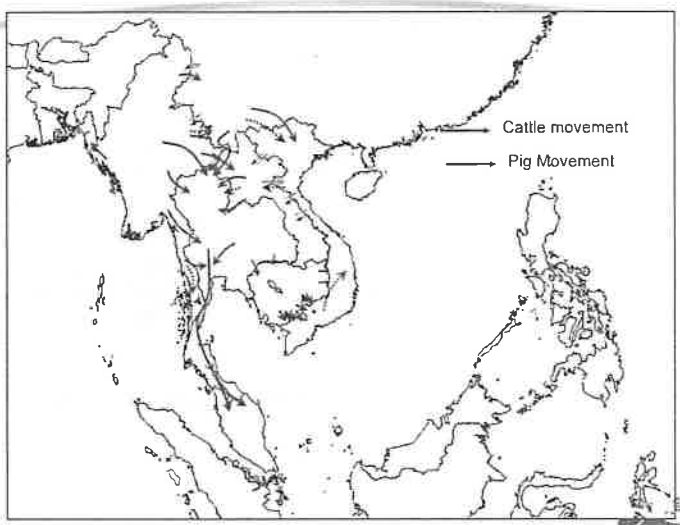
OUTBREAK

- Direct contact of susceptible animal to infected animal or materials (fomite)

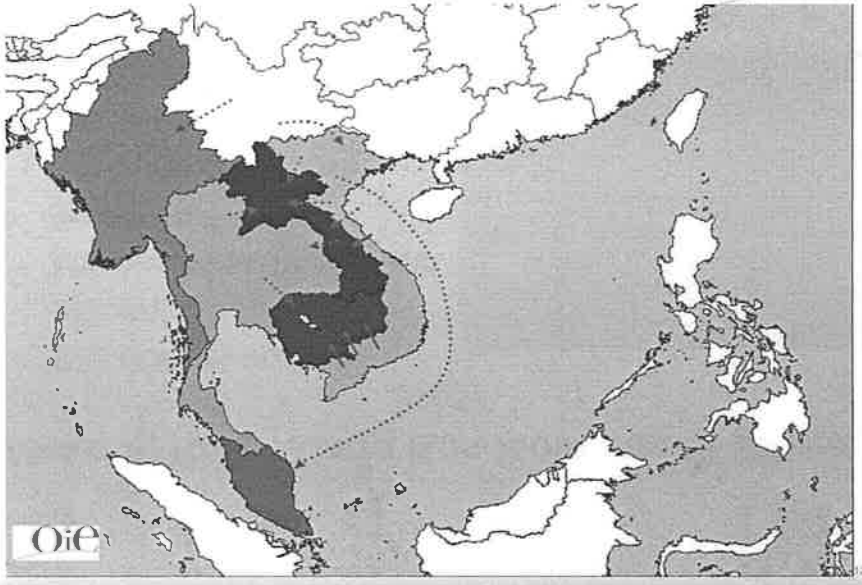
Density Map of Pig Prices



Animal movement (2006)



Pig and Frozen pork movement



Pig Trade vs. population and price

	Pig (Millions)	Import	Export	Comparative Unit Price Ranking	
Cambodia	2.74	+++	-		Moderate
Lao PDR	1.97	++	-		Moderate
Malaysia	2.08	+	+	**	Moderate
Myanmar	6.95	+	-	**	Moderate
Thailand	9.31	+/-	++	**	Moderate Low
Vietnam	26.56	-	++++	*	Low

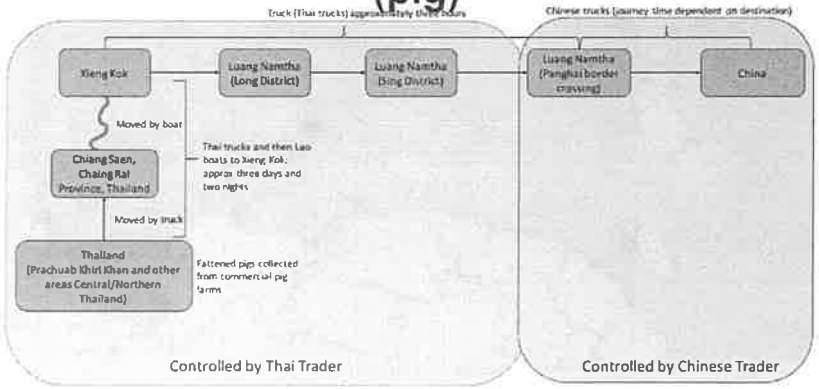
Mekong River-Xieng Kok Movement Pathway (pig)

- One of the most active pathway
- Major sources: Northern and Central Thailand
- 7,000 pigs moved daily
- The journey takes 3 days and 2 nights
- Cheap route with few taxes paid

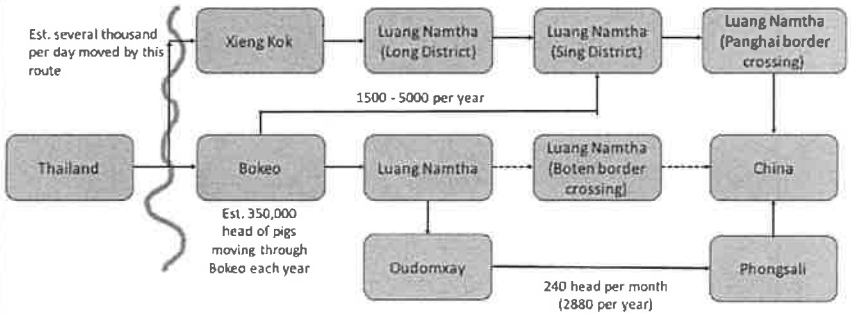
Case study in 2017: Northern Laos Movement Pathways

- Major sources: Thailand
- Legal movements from Thailand to Laos
- Illegal movements are still common to avoid the long waiting period for certificates
- Similar movement pathways as for large ruminants

Mekong River-Xieng Kok Movement Pathway (pig)



Northern Laos Movement Pathways (pig)

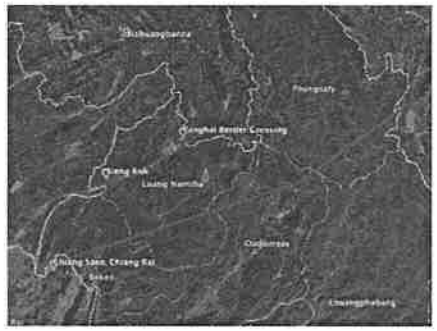


Drivers of animal movement

- Supply (swine population)
- Demand (human consumption
- Price
- Efficient transport

Phongsaly Movement Pathway (pig)

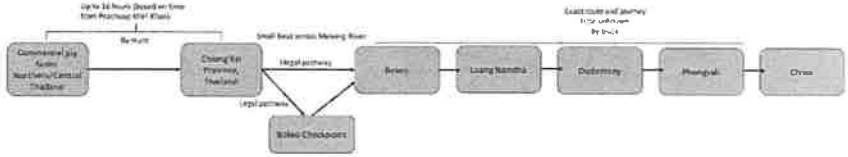
- Little information on the traders
- 240 pigs per month
- Upon the demand on the China side



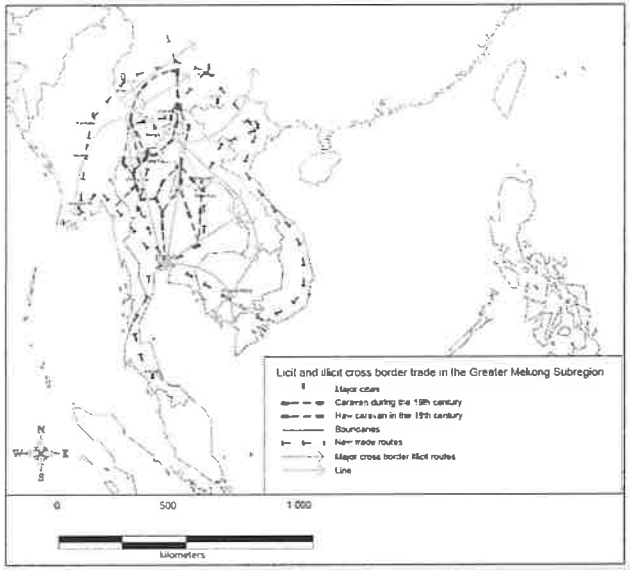
Estimated cost of pig meat & live pig

Country	Pig Meat / kg US$	Live pig / kg US$
Cambodia	4.0	1.3
China PR	3.0	2.1
Hong Kong SAR	2.0	3.0
Indonesia	7.0	3.0
Japan	20.0	37.0
DPR Korea	1.51	0.8
RO Korea	13.0	?
Malaysia	3.9	2.02
Mongolia	2.5 – 3	2.0
Nepal	3.5	2.5
Papua New Guinea	20.0	40.0
Philippines	3.0	1.0
Singapore	8.5	N/A
Thailand	3.55	1.75
Vietnam	1.8 – 2.0	1.3

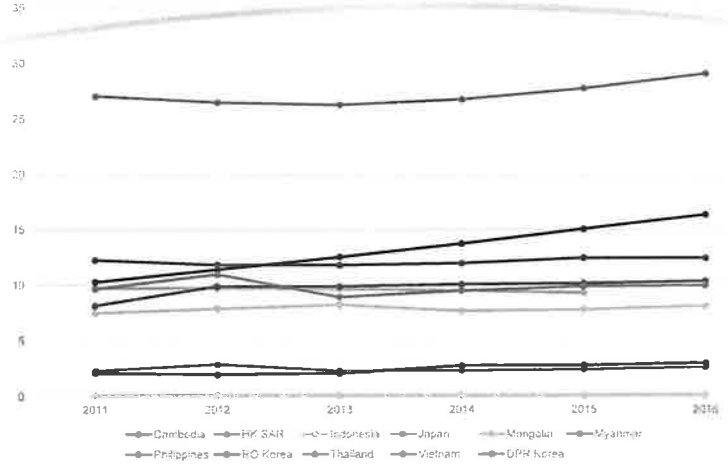
Phongsaly Movement Pathway (pig)



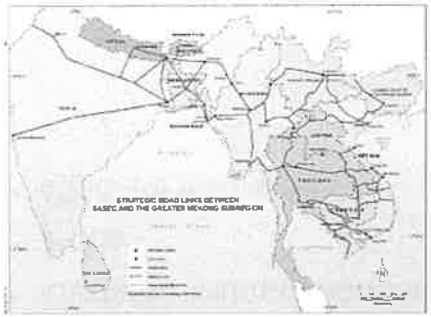
Road network

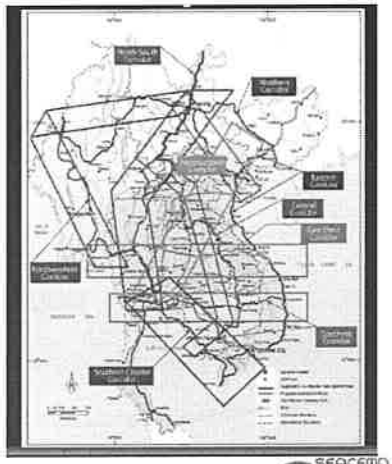


Domestic pig population in Asia (excl. PR China)



Modern Road Network





Projected Human Population

Country	Human population by year in millions			% increase	As % of total
	2010	2020	2030	2010 to 2030	
Laos PDR	6.4	7.7	8.8	38%	2%
PR China	1,359.8	1,432.9	1,453.3	7%	77%
Myanmar	51.9	56.1	58.7	13%	6%
Vietnam	89.0	97.1	101.8	14%	11%
Thailand	66.4	67.9	67.5	2%	1%
Cambodia	14.4	16.9	19.1	33%	4%
Total	1587.9	1678.6	1709.2		

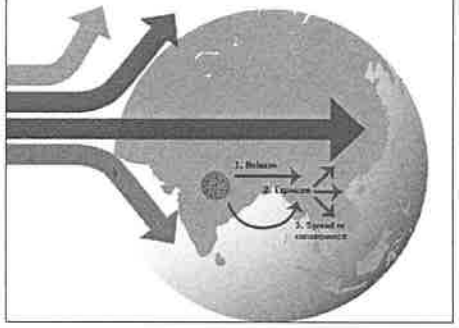
Examples of cross-border spread of TADs

- New strains of FMD virus
  - Pan Asia O serotype in Vietnam in late 1990s and serotype A in 2004
  - Pan Asia O spread in other Laos due to suckling piglets
  - India/2001d incursion in SE Asia
- Hypervirulent PPRS in SE Asia
- PED spread in SE Asa
- **ASF in China**

Modern Road Network

Australian Aid | OIE | SEACFMD | ahw

Risk analysis on incursion of exotic FMD viruses into Southeast Asia



http://www.rr-asia.oie.int/fileadmin/SRR_Activities/STANDZ/STANDZ_Studies/Risk_analysis_exotic_FMD_viruses_May_2017.pdf

Some observations

- Trans-boundary spread of endemic diseases (FMD) follows market chain
- Probability of infection is high during increase of trade (festivals) and during height of the outbreak
- Greater engagement with traders and other stakeholder necessary for effective risk management

Take home messages

- Trans-boundary spread of TADs follows market chain
- Modern roads, efficient transport make it possible for faster spread of TADs
- Probability of infection is high during increase of trade (festivals) and during height of the outbreaks from the source.
- Greater engagement with traders and other stakeholders is essential for effective risk management

Thank you for your attention!

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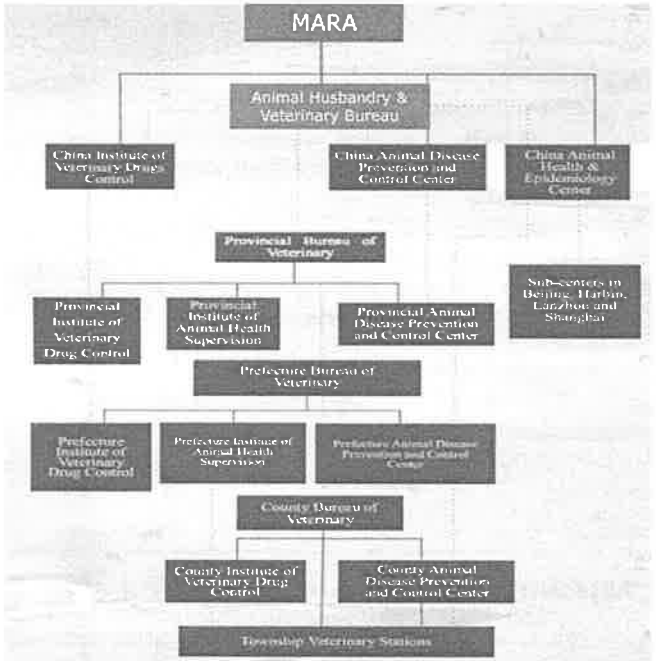


Organization chart of veterinary service in China

Veterinary Staff

By the end of 2017

34,000 stuff, Veterinary administration organization of provincial, prefecture and county level

158,000 stuff, Veterinary health supervision organization of provincial, prefecture and county level

46,000 stuff, Animal disease prevention and control center of provincial, prefecture and county level

150,000 stuff, Township veterinary station

Prevention and Control of FMD in China

Xu Quangang

China Animal Health & Epidemiology Center

2018.10.2

Cebu

Outline

1. China Veterinary System
2. Livestock Production in China
3. FMD outbreaks in China
4. Prevention and Control Strategy
5. Challenges

Livestock Production in China

Number of major livestock (2016)

Species	Pigs (000,000)	Cattle (000,000)	Sheep/goat (000,000)
Inventory	435.037	106.679	301.12
Slaughtered	685.02	51.10	306.946

Production of major animal products in the mainland (2016)

Products	Pork	Beef	Mutton	Milk
Production (000,000 tons, 2016)	52.991	7.168	4.594	37.121
World ranking	1	3	1	3

Veterinary Staff

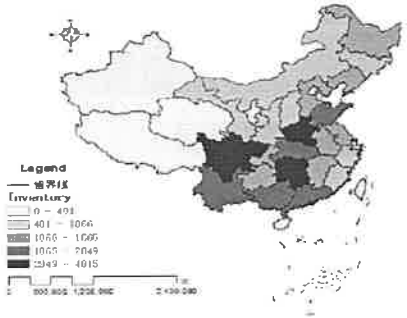
By the end of 2017

140,000, Official veterinarians

100,000, Licensed veterinarians

645,000, Community Animal Health Staff

Pig Inventory and the Density,2016



Pig Inventory

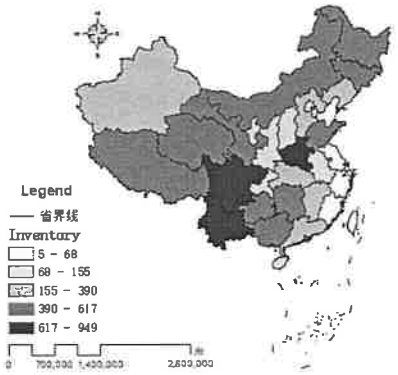
Pig Density

Report and surveillance system

Rearing Characteristics

- Large numbers at high density;
- Low level of commercial farming and high proportion of backyard farms;
- Unbalanced distribution;
- Large and frequent cross-regional movement of live animals.

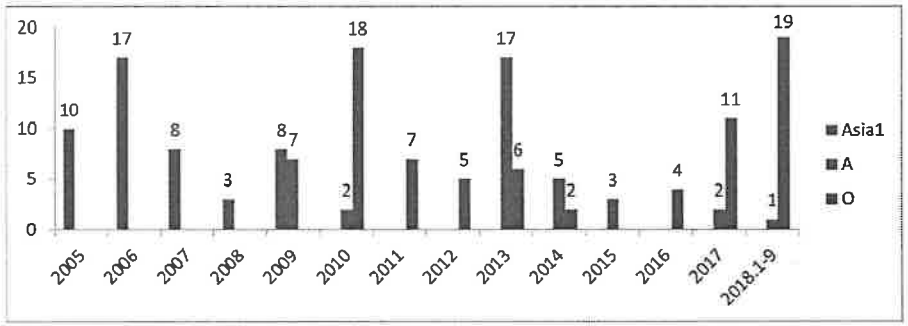
Cattle Inventory and the Density,2016



Cattle Inventory

Cattle Density

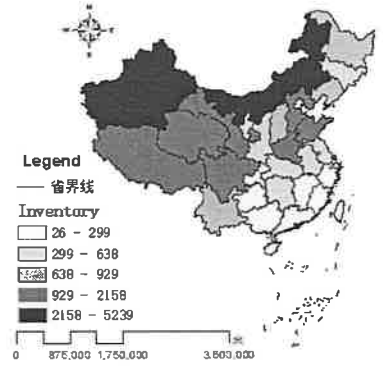
FMD outbreaks in China



Temporal distribution in China (2005-2018.9)

Total 155
O=72, A=37, Asia1=46

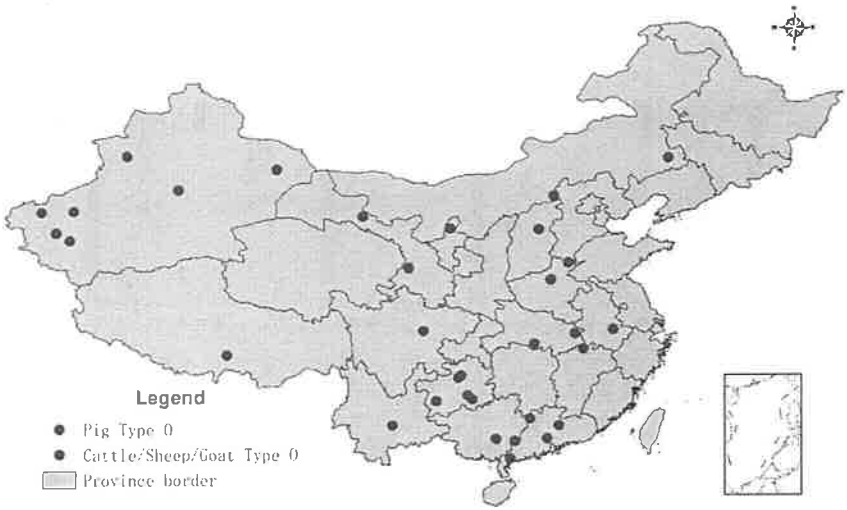
Sheep/Goat Inventory and the Density,2016



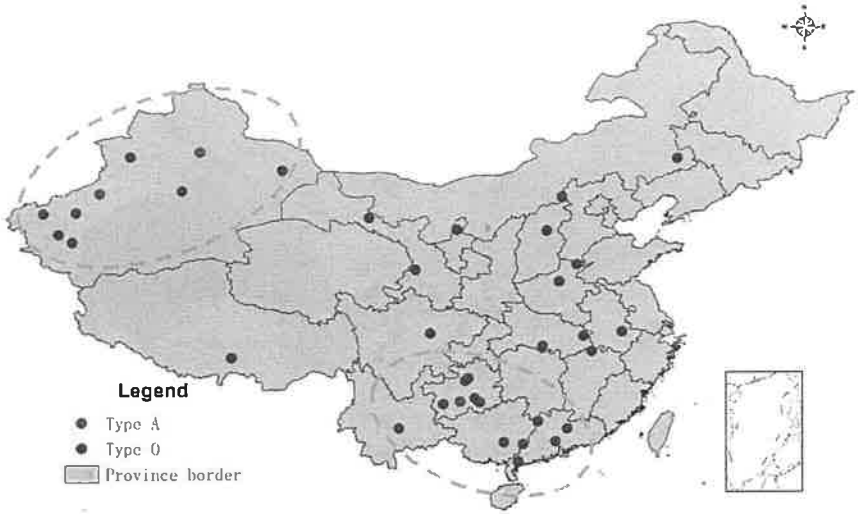
Sheep/Goat Inventory

Sheep/Goat Density

Type O distribution in different hosts since 2016

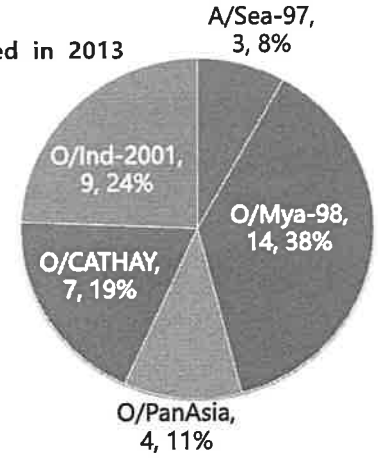


Spatial distribution since 2016



Main epidemic FMDVs in China

- A型 (Serotype A)
  - A/Sea/97 since 2009, re-introduced in 2013
- O型 (Serotype O)
  - O/Mya-98 since 2010
  - O/PanAsia since 2011
  - O/CATHAY since 2016
  - O/Ind-2001 since 2017
- Serotype Asia1
  - Asia1/GV
  - No Asia1 since 2009



The proportion of each FMDV strain since 2016

Distribution of FMD outbreaks in different hosts (2016-2018.9)

Type	No. of outbreaks	Cattle	Pig	sheep
Type O	34	22(65%)	11(32%)	1(3%)
Type A	3	3(100%)	0	0

Compulsory vaccination policy

- Pigs, Cattle, sheep/goats, camels and deer have been vaccinated with type O
- Dairy cattle and breeding bulls have been vaccinated with type A
- Cattle, sheep/goats, camels and deer at the border areas and in Inner Mongolia, Yunnan, Tibet, Xinjiang have been vaccinated with type A
- Cattle, sheep/goats, camels and deer have been withdrawn vaccinated with Asia1 from 1st, July, 2018
- 7 FMD vaccine manufacturers in China

Prevention and Control Strategy

National Medium and Long-term Plan for Animal Epidemic Prevention and Control (2012-2020)

- The overall strategy:
  - Prevention first
  - By epidemic category, by region, and by stage shall be implemented to fully enhance veterinary public service and social service levels.
  - Zoning management


国务院办公厅文件

Compulsory culling

- **Suspected outbreak**
  - **Blockade**
  - **Restrict movement**
- **Confirmed positive**
  - **Culling**
  - **Safety disposal**

FMD Prevention and Control Measures

- **Compulsory vaccination**
- **Compulsory culling**
- **Surveillance and early warning**
- **Zoning management**
- **Strengthen the international collaboration**

Zoning management

Surveillance and early warning

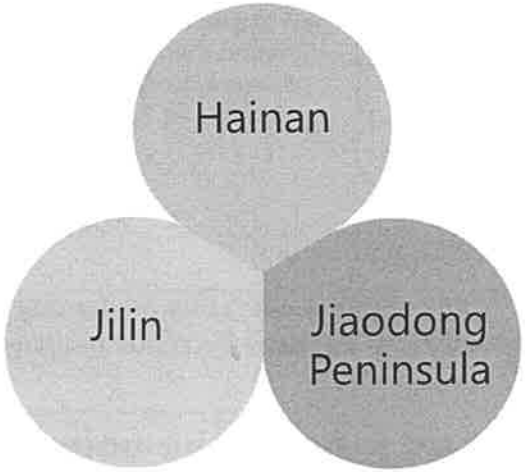
- FMD Reference Laboratory
  - Scheme designing
  - Confirmatory testing of samples
  - Tracking the variation of FMD virus
- Provincial CADC and local laboratories
  - Clinical surveillance
  - Serology surveillance
  - Virology surveillance
- Results published in the Veterinary Bulletin


农业农村部文件

Challenges

- **Domestic factor**
  - Type O and type A coexist
  - Wide range of FMD spread
  - The variation of the strain
  - Large numbers of susceptible animals, and high proportion of backyard
  - cross-regional movement of live animals

Zoning management



Challenges

- Introduction risk of FMD is increasing
  - 22,000-km land border with 14 countries
  - Illegally movement and smuggling

Thank You !

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