

出國報告（出國類別：研究）

畜牧廢棄物再利用 於農地管理策略及技術應用

服務機關：行政院農業委員會畜產試驗所

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摘要

職李欣蓉與劉主欣於民國 106 年 4 月 17 日至 5 月 2 日間，前往美國肯塔基州肯塔基大學進行「畜牧廢棄物再利用於農地管理策略及技術應用」之研習，了解美國畜牧廢棄物管理與應用。該計畫參訪行程皆透過肯塔基大學生物農業環境工程學系 Dwayne Edwards 教授協助安排與規劃，首先 Dwayne 教授示範雨水滲漏各式土壤之評估模型，了解不同質地土壤受淋洗與逕流速度影響，可能造成養分鹽類對地下水之衝擊亦不同；參觀肯塔基大學之畜牧廢水施灌示範實驗農場，該農場利用畜牧固體廢棄物製作堆肥，並將沼液沼渣施灌於該場內農作地，以養分供需平衡之概念強調農牧共構與循環農業之重要；參訪 NRCS (Natural Resources Conservation Service) 係隸屬於美國農業部，主要是輔導農民農場畜禽糞尿管理，提供免費諮詢建議服務，協助糞尿水排放許可與補助申請，並提供雲端地理資訊平台服務，透過營養鹽管理與土壤性質差異，了解目標區域土壤有效性營養鹽含量、土壤淋洗或逕流速率，並可線上換算了解糞尿施灌量與管理計畫。之後透過多位肯塔基大學教授介紹目前該校在畜禽廢棄物管理與研究，首先由 George Day 教授說明該大學實驗農場在畜牧糞尿廢水施灌設計概念；再由 Brad Lee 教授說明該州家禽廢棄物管理模式與缺失、土壤速測與磷指標的重要性；由 Frank Sikora 教授介紹參觀該大學之土壤監測管理服務實驗室，該實驗室接受肯塔基州各地土壤營養鹽監測工作，該實驗室僅收取每樣品 6 美金的費用進行土壤分析，每日送來的樣品數約 360 個樣品，其快速又有效率的檢測方式與設備是本組可學習與修正之處；最後前往該州的環保局，經由 Mr. Ronnie 介紹了解糞肥再利用許可施灌規範與許可證申請辦法。我國就沼液沼渣施灌多半以作物氮肥需求之養分管理作為畜牧廢水施灌標準，常造成磷肥與鉀肥的過量；施灌量計算應可考量該處土壤質地、地形坡度、淋洗逕流速率、雨量等資訊，未來應可建立一雲端地理資訊平台，套疊施灌農地位置與土壤及地下水資訊等資料，透過輸入畜禽糞尿營養鹽濃度、作物需求量等資料，可計算出建議施灌量，亦可做為畜禽糞尿施灌管理與未來畜牧場及農場之媒合平台。

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壹、目的

一、申請背景與目的

「水污染防治法」修正條文已於 104 年 2 月 4 日公布，「水污染防治費收費辦法」也已於 104 年 3 月 31 日由行政院環境保護署修正發布，畜牧業已於 106 年開始徵收水污費。為因應環保法規修訂對畜牧場造成的重大影響，與基於循環農業資源再利用觀點，推動畜牧廢水施灌農地再利用政策勢在必行。目前國際環保趨勢，歐盟國家對經處理或未處理的畜牧糞尿，皆禁止排放到地面水體，所有畜牧糞尿須回歸到農田再利用；沼渣沼液含有多種肥分、胺基酸及微量元素等養分，肥分成分豐富，還能改善土壤理化性質、避免酸化。

台灣近幾年開始積極投入推廣畜牧糞尿及沼渣沼液農田肥分利用政策，提升畜戶與農戶辦理沼渣沼液農田肥分利用媒合率，一方面可針對農業資源循環再利用，另一方面可節省化肥使用量及廢水處理所需之成本，降低農民因水污染防治費徵收所造成的影響。藉由此次國際合作計畫「畜牧廢棄物再利用於農地管理策略及技術應用」之研習，前往肯塔基大學農牧循環示範農場，拜訪該大學專家學者之外，並參訪了該州環保局與自然資源保護處，了解美國對於畜牧廢棄物在管理面、技術面、輔導面與法規面的現況，並將國外經驗帶回台灣，以利我國畜禽產業循環農業政策之推動。

二、前往機構與研究計畫之相關性

該計畫參訪行程主要參訪單位為**美國肯塔基大學**，皆透過生物農業環境工程學系 Dwayne Edwards 教授協助安排與規劃，Dwayne 教授該大學為土壤表面水體逕流及地下水淋洗監測模式之權威，透過土壤及地下水體監測可推估土壤營養鹽移動模式與了解水資源管理；另拜訪多位專家學者，其中 George Day 教授說明該大學實驗農場在畜牧糞尿廢水施灌設計概念；再由 Brad Lee 教授說明該州家禽廢棄物管理模式與缺失、土壤速測與磷指標的重要性；由 Frank Sikora 教授介紹參觀該大學土壤監測管理服務實驗室。**參觀肯塔基大學之畜牧廢水施灌示範實驗農場**，該農場利用畜牧固體廢棄物製作堆肥，並將沼液沼渣施灌於該場內農作地，以養分供需平衡之概念強調農牧共構與循環農業之重要。**參訪自然資源保護處 NRCS (Natural Resources Conservation Service)**係隸屬於美國農業部 (USDA)，主要是輔導農民農場畜禽糞尿管理，提供免費諮詢建議服務。最後

前往該州的環保局畜牧廢水許可部（Kentucky Division of Water Animal Waste Permitting Division），由 Mr. Ronnie Thompson 介紹了解糞肥再利用於肯塔基州可施灌規範與許可證申請辦法。後續將針對各參訪行程之研習心得進行說明。

貳、過程

本次計畫參觀研習行程安排如下表：

日期	星期	地點	活動事項
4/17~4/18	一~二	台灣台北—美國肯塔基州	去程
4/19	三	肯塔基大學	拜訪 Prof. Dwayne Edwards 確認參訪行程
4/20	四	肯塔基大學 生物農業環境工程學系	土壤地下水模擬模型實驗室參訪
4/21	五	自然資源保護處 Natural Resources Conservation Service (NRCS)	拜訪 Prof. Adam Jones 了解畜牧糞肥 與廢水施灌資源再利用經營管理模式研習
4/22~4/23	六~日	肯塔基大學	資料收集與整理
4/24	一	肯塔基大學實驗農場	廢水施灌示範實驗農場參訪
4/25	二	肯塔基大學 生物農業環境工程學系	拜訪 Prof. George Day 了解實驗農場 現場廢水施灌規劃與管理策略
4/26	三	肯塔基大學 植物與土壤科學系	拜訪 Prof. Brad Lee 了解家禽廢棄物 管理模式、土壤速測與磷指標
4/27	四	肯塔基大學 土壤監測服務實驗室	拜訪 Dr. Frank Sikora 了解土壤環境 監測分析模式與技術
4/28	五	環保局畜牧廢水許可部	拜訪 Mr. Ronnie Thompson 了解廢水 施灌規範、許可證申請及環保法規
4/29~4/30	六~日	肯塔基大學	資料收集與整理
5/1~5/2	一~二	美國肯塔基州—台灣台北	回程

參、心得

一、肯塔基大學參訪



圖 1-1 肯塔基大學圖書館外觀

(一) 生物環境工程學系

參訪第一天來到生物農業環境工程學系拜訪 Prof. Dwayne Edwards，教授先帶我們來參觀土壤地下水模擬模型實驗室，並展示各式土壤質地雨水滲漏之評估模型，提到因不同土壤質地之影響，養分鹽類受淋洗與逕流速度亦有所不同，造成養分鹽類移動或對地下水之衝擊亦不同。了解水分在土壤與地下水移動的趨勢，可以模擬養分鹽類在土壤滯留的時間或推估影響地下水的趨勢。

詢問美國畜牧廢水施灌是否擔心因銅鋅含量過高導致農地污染問題，Dwayne 教授表示，在美國因飼養管理的原因，飼料中並未添加銅鋅，所以並沒有廢水施灌污染農地之問題。美國反而比較需要擔心因使用抗生素或生長激素造成的藥物殘留或環境賀爾蒙之影響，不過因為土壤本身也是個過濾體，藥物或激素大多會累積在土壤中緩慢分解，不會造成地下水體污染。

目前台灣在推行沼液沼渣施灌政策時，尚未針對施灌農地土壤質地或水分移動潛勢進行探討，或針對高移動潛勢之農地施灌區域做長時間的監測與調查，若在推

動沼液沼渣施灌政策時，針對配對的農地之土壤與地下水文資料有更充分的了解，搭配政府若能對高移動潛勢的施灌農地做長期監測與調查，應較能解決農民對沼液沼渣施灌政策之疑慮。



圖 1-2 Dwayne 教授介紹地下水量測工具



圖 1-3 不同土壤質地淋洗試驗模型

(二) 植物與土壤科學系

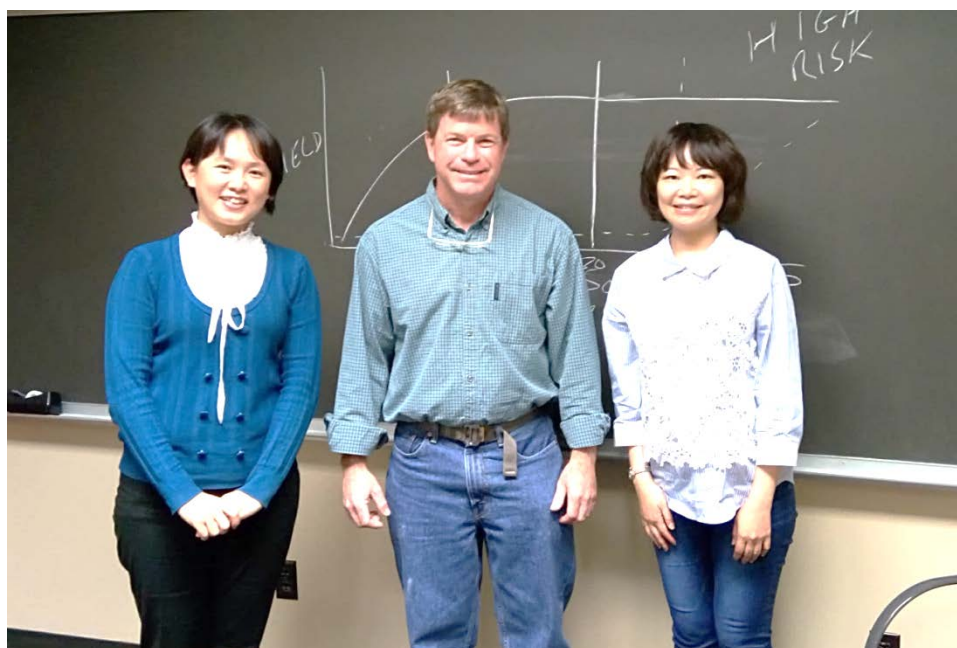


圖 1-4 Brad 教授解說家禽廢棄物管理與 P 指標之重要性

拜訪肯塔基大學植物與土壤學系 Brad Lee 教授討論土壤中磷指標與家禽廢棄物管理，教授提到肯塔基州經過 14 年的土壤速測分析統計結果發現，在都市或居家庭園土壤中，有效性磷的含量遠高於一般農地含量，其中高磷含量風險區域位於藍草區(Blue grass)，該區域土壤質地為石灰質土壤(limestone)，容易有地下水磷過量之疑慮(如圖 1-5 所示)，顯示一般民眾施肥常造成 P 肥過量，可能危害環境與地下水品質，需透過學校教育或宣導強調合理化施肥之重要性。土壤中營養鹽類有效濃度與作物產量大致上呈現正相關，然而過量的營養鹽不但不會增加產量，反而增加施肥成本，更可能影響地下水質。

1990 – 2014 Soil Test Phosphorus (~1,000,000 tests)

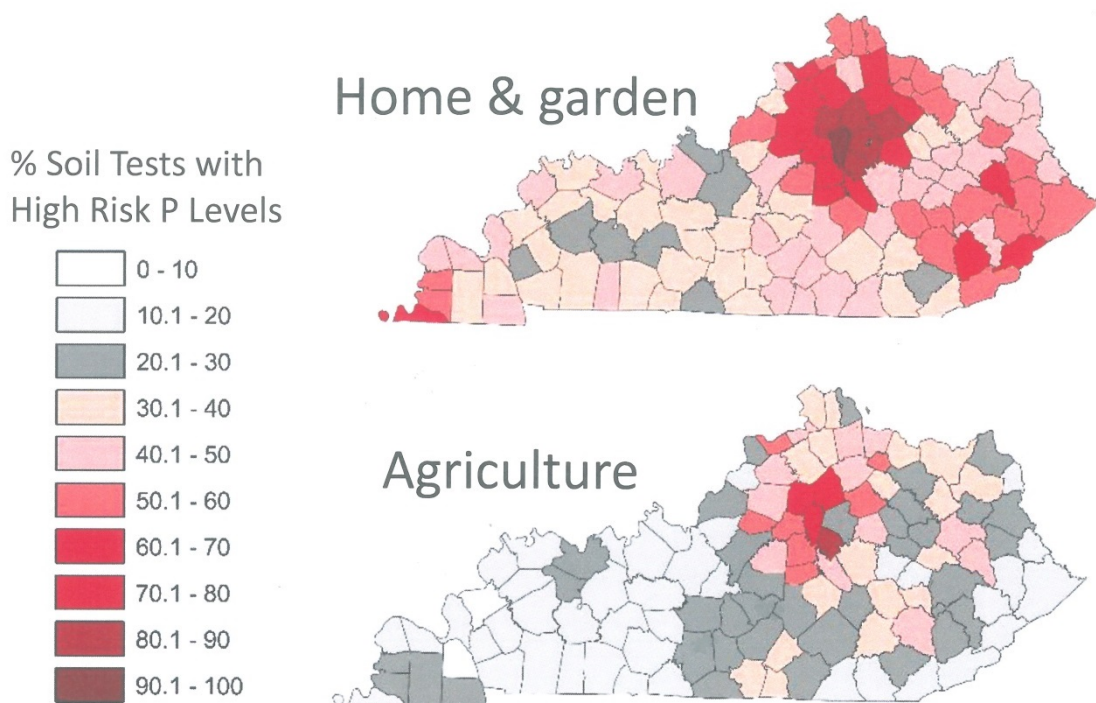


圖 1-5 肯塔基州 1990-2014 年土壤速測磷分布圖

教授亦提到於肯塔基肉雞產業發達，當地肉雞契約飼養場大多在禽糞或墊料中，添加硫酸氫鈉(sodium bisulfate, PLT)或硫酸鋁(aluminum sulfate, Alum)以減少禽糞廢棄物的氨氣揮發，添加比例為 3.8%~3.9%，然而以此類的禽糞或墊料施用於無耕犁土壤中，可能會造成糞便堆肥中的磷無法固定於土壤，容易受到表面逕流移動至地下水，其中又以添加硫酸鋁對表面逕流中磷溶出的量為最，與添加硫酸氫鈉相比有顯著差異。教授提到畜禽糞堆肥營養鹽移動狀態，與飼養管理、堆肥方式、農地

耕犁狀態、氣候或土壤環境等皆息息相關，利用上應該要更廣泛性的探討。

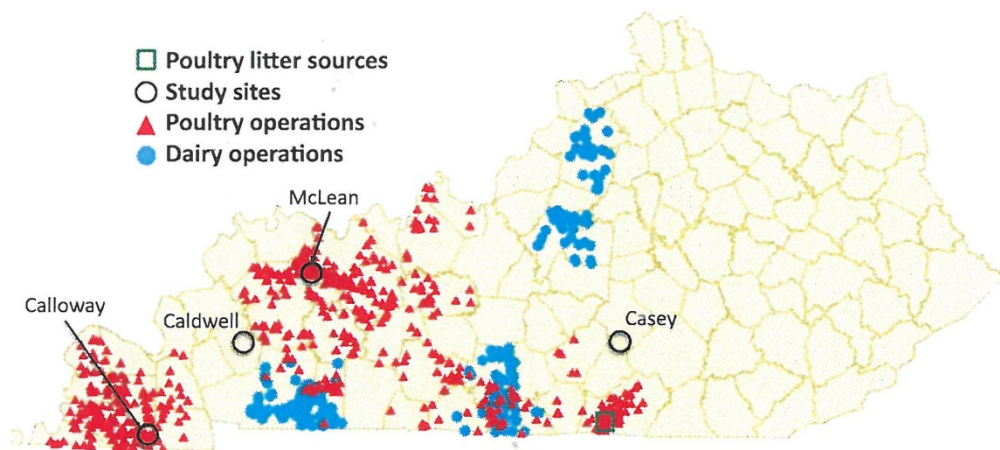


圖 1-6 肯塔基州肉雞飼養契作廠與家禽糞廢棄物處理場分布圖

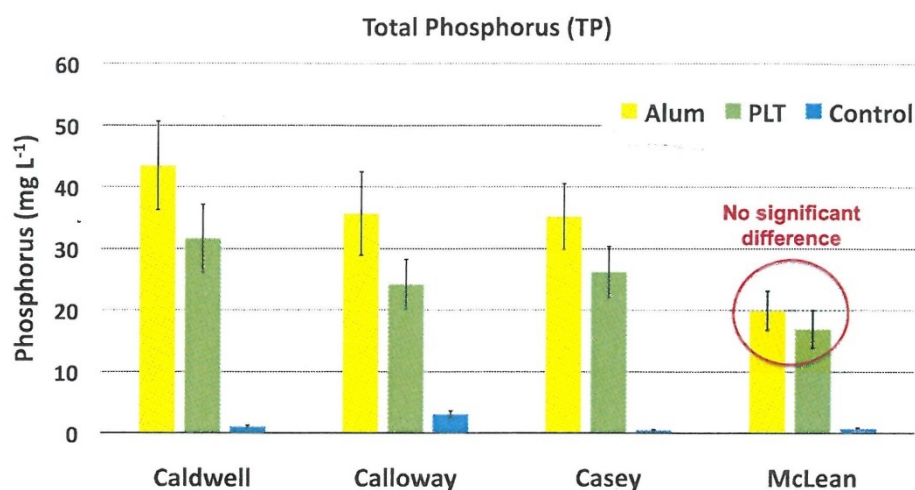


Figure 2. Total phosphorus in runoff from alum litter treatments was significantly higher than PLT litter treatments ($p < 0.05$) at all sites except McLean.

圖 1-7 添加硫酸鋁的禽糞廢棄物逕流中的總磷量與添加 PLT 相比有顯著差異

(三) 土壤監測服務實驗室

由 Frank Sikora 教授介紹參觀該大學之土壤監測管理服務實驗室，該實驗室亦協助 NRCS，接受肯塔基州各地土壤營養鹽監測工作，該實驗室僅收取每樣品 6 美金的費用進行土壤或堆肥之肥份分析，檢測項目包括 pH、EC、NPK 肥力與微量金屬含量等。因每日送來的樣品數約 360 個樣品，為求分析品質好且快速有效率，其分析流程亦有因應之道，例如系統性的樣品編排方式、快速取樣器材、設計每批次樣品可一次處理的操作工具與平台、批次樣品重複性與重複抽樣檢測之再現性等。

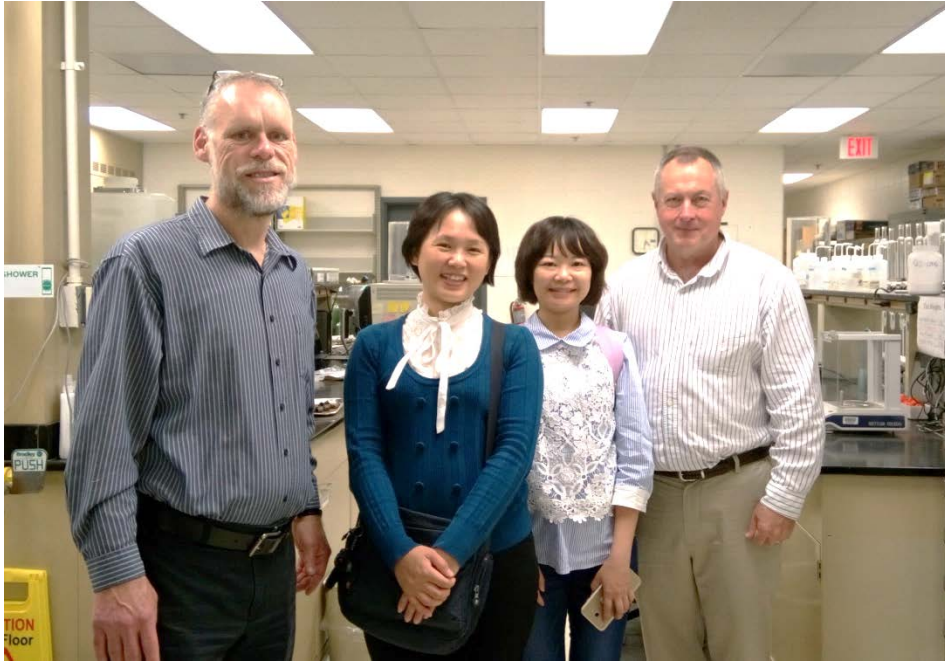


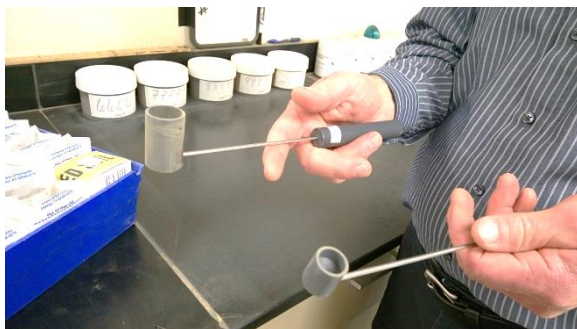
圖 1-8 拜訪土壤監測服務實驗室與 Dr. Frank Sikora(左一)合影



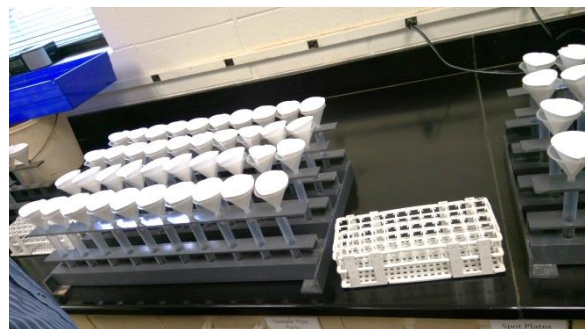
檢測樣品標號分類



每批次樣品做區隔與重複性校正



固定重量之土壤快速取樣器



批次樣品可一次處理

圖 1-9 土壤監測服務實驗室檢測流程規劃系統

該實驗室為求實驗方法與數據品質準確，亦加入實驗室土壤肥份檢測能力認證系統，每個月固定收到一組未知肥份之土壤或堆肥樣品，分析指定項目後經由網站回報數據資料，再由系統將所有實驗室回傳之資料統計標準偏差，讓各個參與單位了解自己的檢測分析方法、流程、操作人員、儀器設備等是否需要進行再檢視或校正。該實驗室肩負肯塔基州土壤或畜禽糞堆肥肥力長期調查與監測分析工作，農民可以透過網頁開放系統自由查詢土壤肥力資料與變化趨勢，更可透過 NRCS 單位之工程師的分析與建議，確認農地施灌畜禽糞尿計畫施肥量；台灣應可比照該州模式，建立長期監測沼液沼渣施灌農地土壤肥力資料庫，提供給民眾或制定施灌計畫承辦人員查詢，可根據該地土壤肥力、作物需求量制定施灌計畫，做到資源再利用營養鹽輸入輸出之平衡。

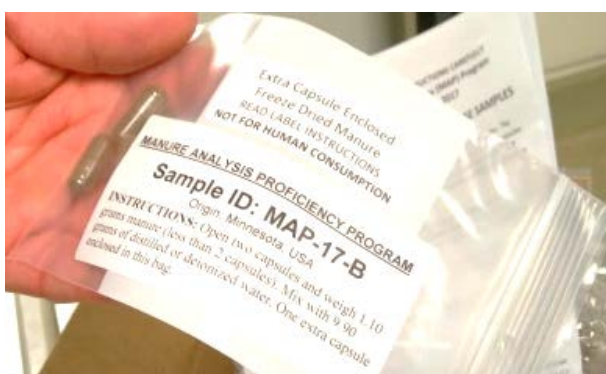


圖 1-10 實驗室檢測認證樣品



圖 1-11 每月於公布各實驗室回傳之數據與偏差值

二、肯塔基大學實驗農場

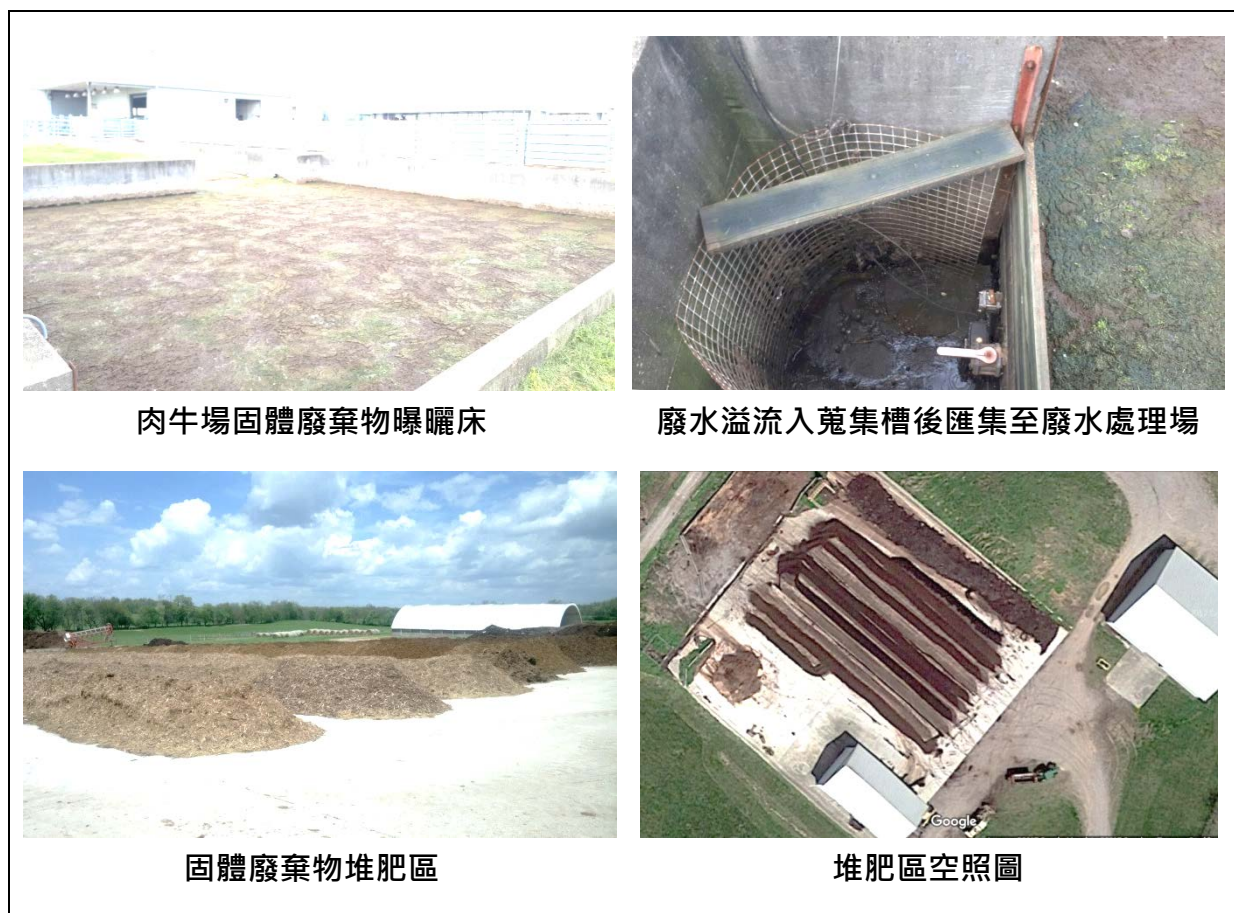
(一) 簡介

肯塔基大學實驗農場是位於學校外的研究中心，佔地面積 1484 英畝，為一依照天然地形與坡度建置之農場，地下水流向為四周往農場中心集中，飼養了 120 頭母豬、800 頭綿羊、250 頭母乳牛與 600 頭肉牛，並種植玉米、小麥與牧草等作物。該農場除了提供學生課程實作、教育訓練與學校研究試驗計畫執行外，也實行畜禽尿與堆肥再利用示範場址，透過每年土壤樣品採樣檢測分析氮磷鉀營養成分，與作物需求量，建立施灌計畫，並在農場四周設立空氣品質監測站，檢測農場四周空氣品質，因場址內畜禽糞尿完全施用於現地供需平衡，加上以距離與作物屏蔽隔絕空氣異味，為該州著名之農牧循環示範場址。



圖 2-1 肯塔基實驗農場

(二) 畜舍管理模式



肉牛場固體廢棄物曝曬床

廢水溢流入蒐集槽後匯集至廢水處理場

固體廢棄物堆肥區

堆肥區空照圖

圖 2-2 肯塔基實驗農場固液廢棄物處理流程

該場畜舍每個星期約清洗 1 到 2 次，固液廢棄物先在曝曬場地進行曝曬，多餘或溢出的廢水會測流到廢水蒐集槽之後，透過管線匯集至廢水處理廠；曝曬後的固體廢棄物則由鏟裝車運輸至農場內的堆肥處理區進行堆置。George Day 教授提到因該農場的堆肥品質很好，附近居民都會定期來排隊領取場區內堆肥回去施灌農地。

(三) 廢水處理廠

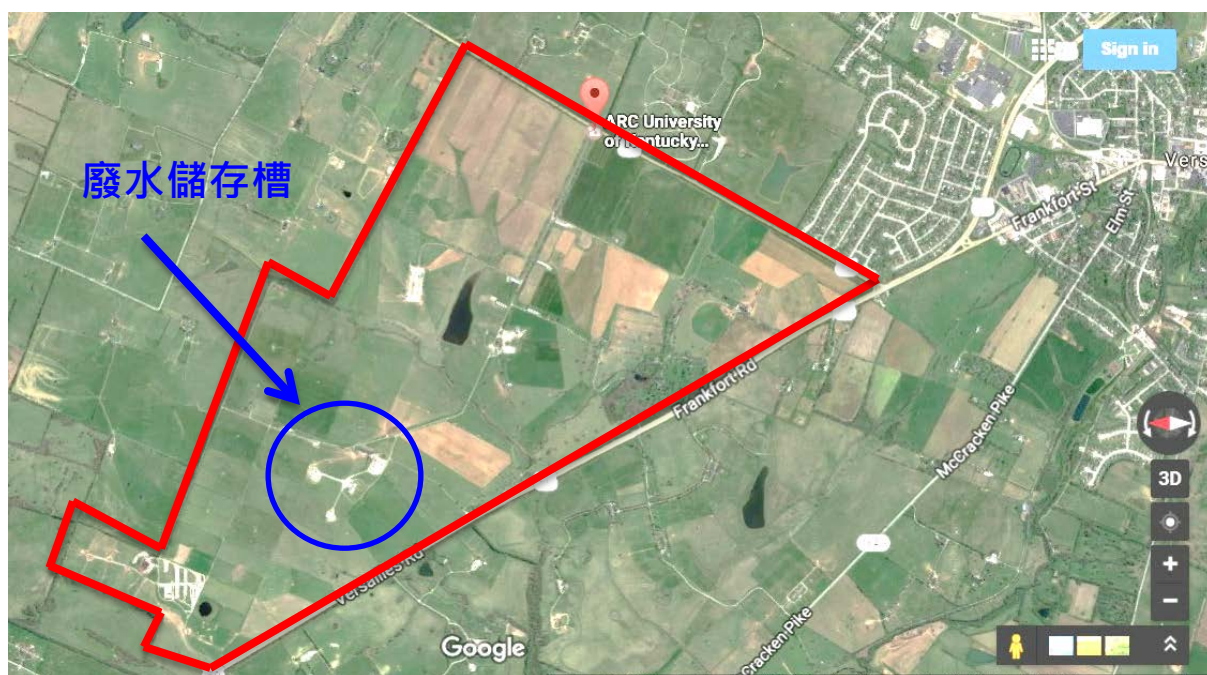


圖 3-1 農場範圍與廢水儲存槽相對位置

廢水經匯集到廢水水場地下儲存槽體為 14,400 立方英尺，換算容積約 390 公噸。3 座廢水儲存槽體形式為大型直立式發酵槽，係為不鏽鋼槽體外圍以 30 公分厚的磚牆圍繞，每個儲存容量約 600 公噸，共可儲存約 180 天左右的廢水量。施灌模式為將廢水從儲存槽經由地下管線運至施灌農地外的儲存槽後，再以噴灌或注入土壤兩種方式施灌。

農場內廢水施灌頻率為每年施灌 2 次，因該地質為石灰質土壤，施灌廢水量計算係以磷濃度為指標，搭配作物施肥所需磷酐濃度作為施灌量，不足的氮肥再以該農場以固體廢棄物製作之堆肥補充。透過每年的整個場區定點土壤肥力採樣與場中心地下水匯集處地下水與四周土壤採樣調查記錄，建立起農場肥力分布圖，可了解每年土壤養分因作物吸收或雨水流失的輸出量，以及施灌畜牧廢水或堆肥的輸入量，盡力達到農場土壤養分供需平衡狀態。



廢水儲存槽空照圖



廢水先匯集至地下儲存槽



槽體內水質透過電子儀器監測



大型直立式發酵槽

圖 3-2 實驗農場廢水處理場

三、 自然資源保護處(NRCS)



圖 3-1 感謝 NRCS 的 Mr. Adam Jones(左一)對我們進行簡報說明

NRCS 隸屬於美國農部，負責協助農民提出畜禽廢棄物管理建議之 Mr. Adam Jones 為我們進行解說。Adam 先生提到畜禽糞處理一直是所有農民在經營管理上的最大問題，除了可以透過不同畜禽糞水分含量進行分類後再制訂管理計畫之外，可供儲存廢水的場地、環境政策或附近住戶的接受度也是要考量的關鍵。

目前在美國的畜禽糞廢棄物管理模式可以分作 7 大類：

1. 瀉湖式(lagoons or outdoor earthen holding ponds)：直接將畜禽糞尿廢水漫灌排放至土牆式池子中，有的會在地面上先鋪設防水布或防水層。須注意氣味造成空氣品質不佳、氣候、蚊蠅孳生等問題。
2. 高床式畜舍地面下貯存(below the floor storage)：常見於高床式或地板為條狀欄杆式的畜舍，畜禽糞可直接掉落於畜舍地面下貯存。
3. 地面式貯存槽(above ground tank)：直接將畜禽糞尿廢水儲存於地面槽體。
4. 堆肥式床包墊料(composted bedded pack barns)：畜舍墊料利用壤土、木屑末等鋪設，定時翻堆，底層通氣，讓表層保持乾燥且使畜禽糞尿與墊料混合並發酵，約 1.5~2 年後再將整批發酵後的墊料以栽培土或堆肥方式販售。
5. 乾式堆放(dry stack barns)：可翻堆也可不翻堆，不受雨季影響，可儲存 6 個月

左右。

6. 戶外直接堆放(uncovered piles)：容易因雨季或逕流造成影響。
7. 機械式存放設計(mechanical process)：例如沼氣池設置、過濾、固液分離設備等，此種類型在肯塔基州較不普遍。

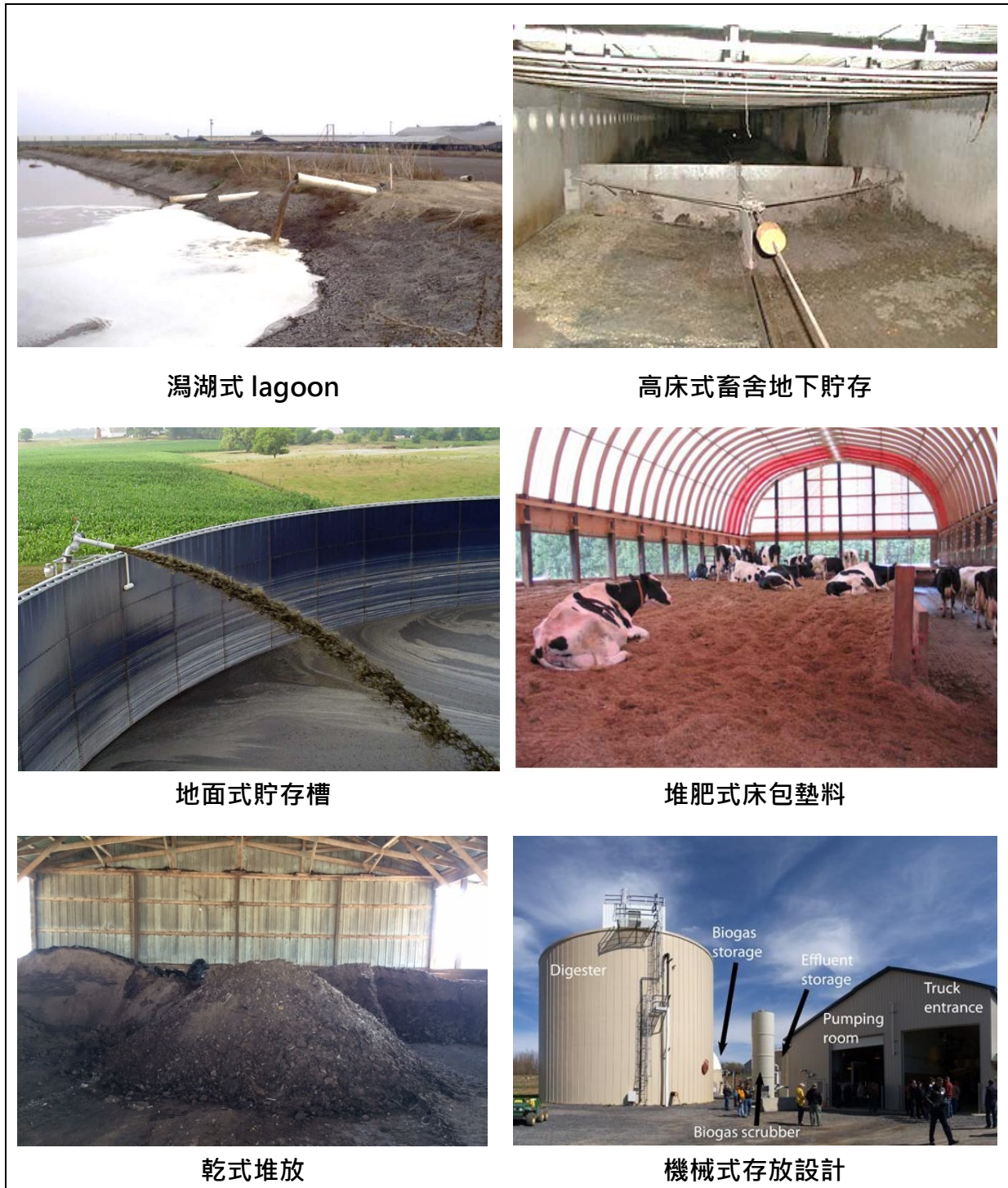


圖 3-2 美國常見畜禽糞管理模式

NRCS 主要是提供畜禽糞利用模式之技術性建議給農民，由農民自行決定選擇怎樣

的利用方式係對自己有益，因此 NRCS 需設計一套簡易判斷選擇施行方式之流程，讓農民能以淺顯易懂的方式，了解自己的農場畜禽糞尿管理最適合怎樣的管理計畫。

Do I Need an Ag Water Quality Plan or a Nutrient Management Plan?

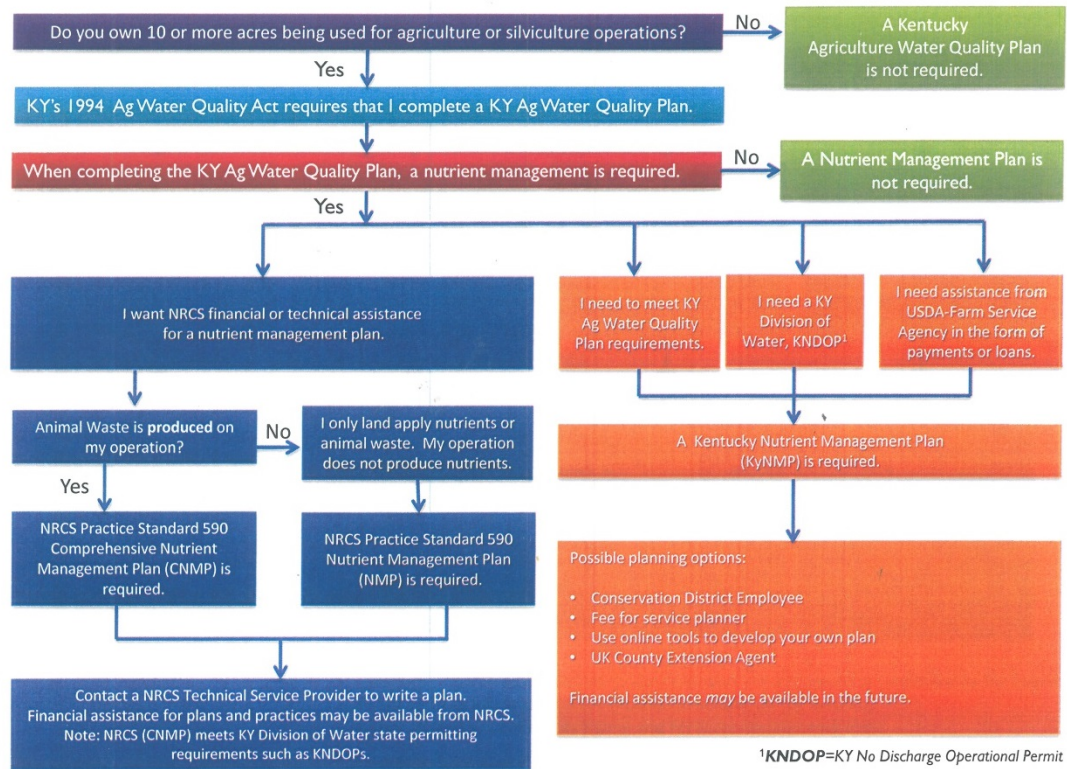
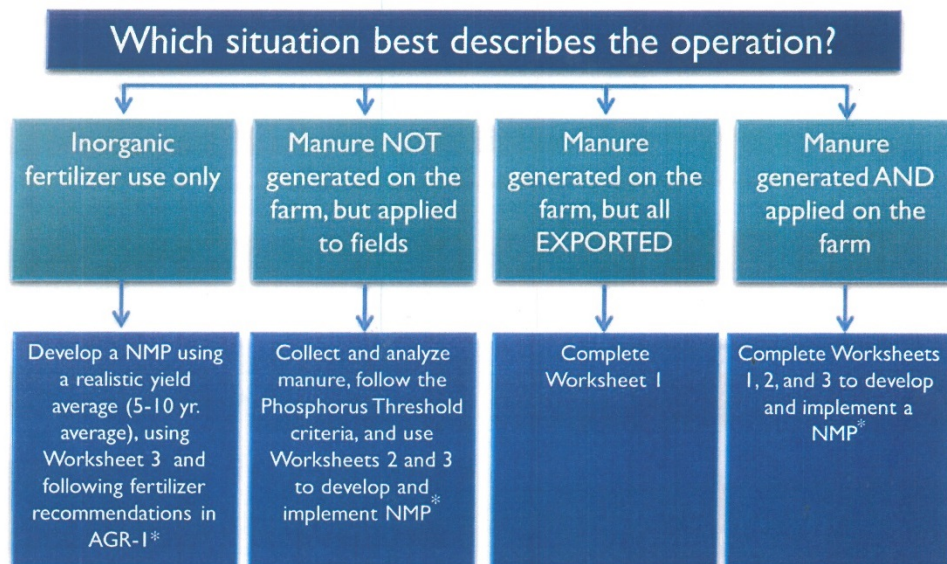


圖 3-3 以 YES-NO 流程設計簡易判斷適合之施行計畫



* Producers that have permission to use fields that are not owned or controlled by the operation should develop a land control certification (available on the website).
AGR-1: University of Kentucky's Lime and Fertilizer Recommendations

圖 3-4 以表格分類簡易分析執行計畫模式

另外 Adam 先生亦介紹了很多網頁工具資料可供畜禽糞規劃者或農民查詢自家農舍四周環境的地理資訊，土壤調查資料，依照坡度、質地、水文條件、氣候等因子可計算土壤流失方程式，對於了解施用模式、適合種植作物或擬訂畜禽糞再利用計畫上都是很有用的工具。



全美國的土壤調查資訊

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Revised Universal Soil Loss Equation, Version 2 (RUSLE2)
Official NRCS RUSLE2 Program
Official NRCS Database

This site contains the official NRCS version of RUSLE2. It is the only version of RUSLE2 to be used for official purposes by NRCS field offices. The NRCS developed and maintains the database components on this site. These components comprise the Official NRCS RUSLE2 Database. The official NRCS RUSLE2 database is the only database to be used for official purposes by NRCS field office employees.

RUSLE2 is an upgrade of the test based RUSLE2 DOS version 1. It is a computer model containing both empirical and process-based science in a Windows environment that predicts till and interrill erosion by rainfall and runoff. The USDA-Agricultural Research Service (ARS) is the lead agency for developing the RUSLE2 model. The ARS, through university and private contractors, is responsible for developing the science in the model and the model interface.

For further information about the databases, contact Linda Scheffe at Linda.Scheffe@lin.usda.gov.

For science related issues, contact Giulio Ferruzzi at giulio.ferruzzi@ar.sr.usda.gov.

Additional information on RUSLE2 is available at the [ARS Oxford Mississippi National Sedimentation Laboratory](http://ARS.Oxford.Mississippi.National.Sedimentation.Laboratory.website) website.

Note: This site is optimized for use with Internet Explorer 6.0. To install IE 6.0 see you local computer Administrator or visit the Microsoft website at www.microsoft.com.

Welcome to the Manure Management Planner Home Page

MMP status (click to enlarge)



Click here to go to the [Public Response Home Page](#)

LAST updated: May 17, 2017

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For more information, click on a topic:

- [What is Manure Management Planner?](#)
- [What's new in MMP? version 3.302 \(as of 03-May-2017\)](#)
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- [Externally Asked Questions about MMP?](#)
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[Microsoft "Clear"](#)

(Click a firm and download layers for your GIS and a RUSLE2 database for MMP)

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(Free GIS front-end for MMP)
Updated 26-Jul-2015

輸入相關資料可換算土壤流失速率

協助畜禽糞管理規劃網站

圖 3-5 協助農民擬定管理政策之網站介紹

四、 環保局畜牧廢水許可部



圖 4-1 拜訪 Mr. Ronnie Thompson 了解廢水施灌規範、許可證申請及環保法規

前往肯塔基州環保局畜牧廢水許可部門拜訪 Mr. Ronnie Thompson 討論當地廢水施灌許可規範。Ronnie 先生提到，美國環保署將大規模動物飼養農戶定義為「集中動物管理經營(CAFOs)」，依據清淨水法(Clean Water Act, CWA)將這些 CAFOs 視為點源污染，其管理要求必須要做到 1. 建物設計須經核可或認證；2. 貯存設施需防止溢漏；3. 貯存容量需可因應暴雨事件或不適施用的情形發生；4. 場址需距水體、建築管線有適當距離。

而美國農部(USDA)則是鼓勵這些動物飼養農戶執行營養鹽管理計畫(Nutrient management (Code 590)，鼓勵業者自願規劃畜禽糞尿廢棄物，採取適當糞肥管理措施以符合環境水質規範。申請時需要依照實際作物耕種需求，土壤檢測資料亦須為 5 年內的數據，包括 pH、EC、土壤有機質、氮磷鉀等養分資料。營養鹽施灌方式，亦需要根據作物生長特性、吸收特性、氣候條件、風險評估(例如入滲或淋洗指標、磷指標等資料)，以降低營養鹽進入水體之風險和進入大氣造成污染、減少損失、施灌時間應注意不可在土壤已飽和或無法吸收水分的狀態下進行(如冰凍或覆雪土壤，降雨前 12 小時或降雨後 48 小時)。Ronnie 先生亦提到若能符合肯塔基州的 401KAR 5:005 環保法規中第 25 章節中的提到無排放作業許可證(Kentucky No Discharge Operational Permits, KNDOPs)標準，

則該農戶將不被視為 CAFOs，相關文件資料也於附錄中呈現。

肆、感想與建議

本次出國行程感謝肯塔基大學生物農業環境工程學系 Dwayne Edwards 教授協助安排與規劃，教授規劃行程非常用心，先讓我們從土壤與地下水逕流淋洗模型實驗室中了解環境因子對畜禽糞再利用之影響與重要性；在土壤監測服務實驗室中了解政府部門針對建立基本土壤環境資料庫之必要性；透過家禽廢棄物管理模式研究了解不同質地或特性的土壤，進行再利用時所關心的營養鹽種類不只是氮濃度，磷指標可能也是減少地下水污染之關鍵；再經由該大學試驗農場所建立之農牧循環再利用示範場址的介紹，了解如何將數據資料或原理技術轉化成實際應用於畜禽廢棄物管理規劃；透過自然資源保護處了解技術人員如何以深入淺出的方式讓農民了解並選擇適合自己畜牧場需求的營養鹽再利用計畫策略；最後透過環保局畜牧廢水許可部的環保法規介紹，了解政府如何輔導農民進行許可證申請與了解廢水施灌規範，針對本次的參訪行程，歸類出以下幾點建議：

一、沼液沼渣再利用應配合作物需求與環境限制

台灣就沼液沼渣施灌多半以作物氮肥需求之養分管理作為畜牧廢水施灌標準，常造成磷肥與鉀肥的過量，建議應了解再利用場址之廢水營養鹽濃度，施灌量計算除了解施灌處作物養分需求之外，可與農地土壤質地、地形坡度、淋洗逕流速率、雨量等資訊作結合，並於淋洗或逕流高風險農地進行長時間監測，更能了解並修正台灣執行此再利用政策方針。

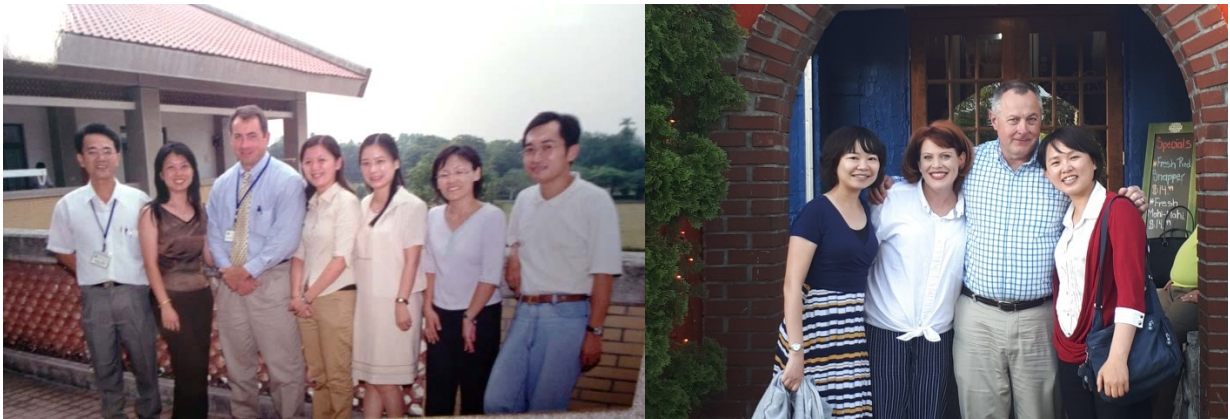
二、輔導農民選擇適合的廢水處理模式

有好的飼養管理與廢水處理模式，後續談沼渣沼液利用、堆肥或沼氣發電等加值利用才有利基。大部分台灣畜牧產業者對廢水處理仍然陌生，多半是想改善卻不知從何處做起，或擔心投入的改善成本是否有實質上的效益而卻步，政府應有個能實際深入各地輔導農民的機構或平台，站在輔導農民而非稽查對立的角色，設計多種符合不同規模產業別之畜牧業者可以依循的廢水處理模式，讓農民容易理解且可自行選擇適合自己的改善模式，做好飼養管理與廢水處理，才能真正達到農業廢棄

物循環再利用的目標。

三、 建立雲端地理資訊平台

推行畜牧廢棄物再利用政策，政府應需有能提供農民或施用計畫決策者相關基礎分析資訊之能力，未來應可建立一雲端地理資訊平台，套疊施灌農地位置與土壤、地下水、地形、氣候、雨量等資訊，透過輸入畜禽糞尿營養鹽濃度、作物需求量等資料，可計算出建議施灌量，更可做為畜禽糞尿施灌管理與未來畜牧場與農場之媒合平台。



17 年前 Dwayne 教授來本所參訪，17 年後本所參訪肯塔基大學感謝教授協助安排

伍、 附錄

KNDOP Regulations

401 KAR 5:005

Section 25. Kentucky No Discharge Operational Permits (KNDOPs). A Kentucky No Discharge Operational Permit (KNDOP) shall only be issued to a facility that does not discharge and does not intend to discharge to waters of the Commonwealth, including agricultural waste handling systems and facilities that dispose of effluent by spray irrigation.

(1) Nutrient Management Plans. An animal feeding operation shall have a nutrient management plan consistent with the Agriculture Water Quality Act, KRS 224.71-100 through 224.71-145 and the NRCS Conservation Practice Standard Code 590 for Kentucky.

(2) The plan shall, to the extent applicable, also address the following elements:

- (a) Ensure adequate storage of manure, litter, and process wastewater, including procedures to ensure proper operation and maintenance of the storage facilities;
- (b) Ensure proper management of animal mortalities to ensure that they shall not be disposed of in liquid manure, storm water, or process wastewater storage or treatment system;
- (c) Ensure that clean water shall be diverted from the production area;
- (d) Prevent direct contact of confined animals with waters of the Commonwealth;
- (e) Ensure that chemicals and other contaminants handled on-site shall not be disposed of in manure, litter, process wastewater, or storm water storage or treatment system, unless specifically designed to treat chemicals and other contaminants;
- (f) Identify site-specific conservation practices to be implemented to control runoff of pollutants to waters of the Commonwealth;
- (g) Identify protocols for testing of manure, litter, process wastewater, and soil;
- (h) Establish protocols to land apply manure, litter, or process wastewater in accordance with site-specific nutrient management practices that ensure agricultural utilization of the nutrients in the manure, litter, or process wastewater; and
- (i) Identify records that shall be maintained to document the implementation and management of the minimum elements described in paragraphs (a) through (h) of this subsection.

(3) Additional Measures for Animal Feeding Operations.

- (a) Visual inspections. There shall be routine visual inspections of the production area. The following shall be visually inspected:
 1. Weekly inspections of all storm water diversion devices, runoff diversion structures, and devices channeling contaminated storm water to the wastewater and manure storage and containment structure;
 2. Daily inspections of drinking water or cooling water lines; and
 3. Weekly inspections of the manure, litter, and process wastewater impoundments. The inspection shall note the level in liquid impoundments as indicated by the depth marker in paragraph (b) of this subsection.
- (b) Depth marker. An open surface liquid impoundment shall have a depth marker that clearly indicates the storage capacity.
- (c) Corrective actions. A deficiency found as a result of an inspection shall be corrected.
- (d) Mortality handling. A mortality shall not be disposed of in liquid manure or process wastewater system and shall be handled in a way that prevents the discharge of pollutants to surface water.

(4) Record Keeping Requirements for the Production Area. Each AFO shall maintain on-site, for a period of five (5) years from the date they are created, a complete copy of the information required by subsection (2)(i) of this section, and the records specified in paragraphs (a) through (f) of this subsection. The AFO shall make these records available to the cabinet for review upon request.

- (a) Records documenting the inspections required pursuant to subsection (3)(a) of this section;
 - (b) Weekly records of the depth of the manure and process wastewater in the liquid impoundment as indicated by the depth marker pursuant to subsection (3)(b) of this section;
 - (c) Records documenting an action taken to correct deficiencies required pursuant to subsection (3)(c) of this section. Deficiencies not corrected within thirty (30) days shall be accompanied by an explanation of the factors preventing immediate correction;
 - (d) Records of mortalities management and practices used by the AFO to meet the requirements of subsection (3)(d) of this section;
 - (e) Records documenting the current design of manure or litter storage structures, including volume for solids accumulation, design treatment volume, total design volume, and approximate number of days of storage capacity; and
 - (f) Records of the date, time, and estimated volume of any overflow.
- (5) Recordkeeping requirement for the land application areas.
- (a) Each AFO shall maintain on-site a copy of its site-specific nutrient management plan.
 - (b) Each AFO shall maintain on-site for a period of five (5) years from the date it was created a complete copy of the information required by the permit application Short Form B, the information required by subsection (2)(i) of this section, and the records specified in paragraphs (a) through (j) of this subsection.
 - (c) The AFO shall make these records available to the cabinet for review upon request.

1. Expected crop yields;
 2. The date manure, litter, or process waste water is applied to each field;
 3. Weather conditions at time of application and for twenty-four (24) hours prior to and following application;
 4. Test methods used to sample and analyze manure, litter, process waste water, and soil;
 5. Results from manure, litter, process waste water, and soil sampling;
 6. Explanation of the basis for determining manure application rates, as provided in the NRCS Conservation Standard Practice Code 590 for Kentucky;
 7. Calculations showing the total nitrogen and phosphorus to be applied to each field, including sources other than manure, litter, or process wastewater;
 8. Total amount of nitrogen and phosphorus applied to each field, including documentation of calculations for the total amount applied;
 9. The method used to apply the manure, litter, or process wastewater; and
 10. Each date of manure application equipment inspection.
- (6) If an animal feeding operation does not discharge, does not intend to discharge, and obtains a Kentucky No-Discharge Operational Permit pursuant to this section, the cabinet shall not consider the animal feeding operation a CAFO.
- (7) Permit conditions.

(a) A permit may contain special conditions that in the best professional judgment of the cabinet are necessary to comply with KRS Chapter 224 and 401 KAR Chapters 4 through 11.

(b) The conditions shall be in writing and shall be treated as part of the permit.

(c) The following conditions shall apply to all KNDOPs.

1. There shall not be a point source discharge of wastewater from the facility.

2. The permit authorizes operation only of the WWTP described in the permit in the manner and under the conditions described in the permit application and supporting documents as approved by the cabinet in the permit.

3.a. The permit shall not be construed as authorizing an operation that is otherwise in contravention of a statute, administrative regulation, ordinance, or order of a governmental unit.

b. The permit shall not be construed to authorize the creation or maintenance of a nuisance.

4.a. The permit shall be subject to revocation or modification by the cabinet as established in KRS Subchapter 224.10-100.

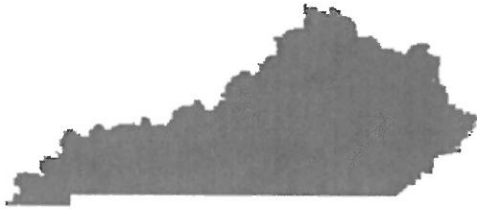
b. Commencement of a routine point source discharge shall result in a permit revocation.

5. A permit shall be issued in accordance with the provisions of KRS Chapter 224 and 401 KAR Chapters 4 through 11. Issuance of the permit shall not relieve the permittee from the responsibility of obtaining any other permits or licenses required by the cabinet and other state, federal, and local agencies.

6. If applicable, the waste materials removed from the settling basin shall be disposed of according to the requirements of the Division of Waste Management in 401 KAR Chapters 30 through 49.

7. Land application that results in runoff to a stream shall be prohibited.

KPDES



KENTUCKY POLLUTANT
DISCHARGE ELIMINATION
SYSTEM

FACT SHEET

**General Kentucky No Discharge Operational Permit (KNDOP)
for Small and Medium Animal Feeding Operations (AFO)**

KPDES No.: KNDOP AFO

AI No.: 35050

Date: September 22, 2016

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SECTION 1

SYNOPSIS

1. SYNOPSIS

1.1. Introduction

Agricultural livestock operations typically must handle animal waste that accumulates in areas where animals are confined or stabled for feeding, milking, or otherwise maintained. The waste may be handled by being pumped, washed or scraped into a storage structure. The structure should be designed and constructed to contain the amount of waste generated by the animals present without discharge to waters of the Commonwealth. The waste generally remains in the storage structure until it can be land applied to crops or fields. Animal waste is high in nutrient content, i.e. nitrogen, potassium and phosphorus, making it useful as an alternative to chemical fertilizer. Land application is typically done using manure spreaders, draglines, pivoting irrigation guns or injection machinery.

Title 401 of Kentucky's Administrative Regulations (KAR) state that a person shall not construct, modify, or operate a facility without having received a permit from the cabinet (401 KAR 5:005, Section 1(2)). The regulation goes on to state in Section 1(3)(a)2b, that agricultural waste handling systems shall obtain a Kentucky No Discharge Operational Permit (KNDOP). The Division of Water (DOW) has issued nearly 1400 KNDOPs to such facilities. Approximately 1100 of these facilities are classified as Small or Medium Animal Feeding Operations (AFOs).

Due to the similarity in the wastes produced and the method of management the Division of Water (DOW) has determined that a General KNDOP for Small and Medium Animal Feeding Operations (AFOs) that utilize an agricultural waste handling systems and any associated land application areas is the most efficient and effective process for management of these permits. Examples of animal waste handling systems include but are not limited to a manure storage pit below a hog barn, a holding pond for storage of dairy cow waste, milk house wastewater, or an exposed stack pad for beef manure.

Operations not using an agricultural waste handling system or utilizing a dry manure system are not required to obtain coverage under this permit. Examples of dry systems include but are not limited to covered stack pads for beef manure, barns containing horse muck or chicken houses that store litter.

1.2. Area of Coverage

This general permit authorizes the operation of Small and Medium AFOs located within the 120 counties of the Commonwealth of Kentucky.

1.3. Description of Applicant's Operation

This general permit authorizes the operation of Small or Medium AFOs that operate no discharge agricultural waste handling systems and any associated land application areas. This permit does not cover facilities that may be agricultural in nature, but manage a waste other than manure, such as a slaughterhouse or other processing plant.

1.4. Limitations on Coverage

This permit does not authorize the operation of Small or Medium AFOs:

- (1) with a direct discharge into waters of the Commonwealth; or
- (2) that are classified as large animal feeding operations; or
- (3) that DOW determines are more appropriately addressed by an individual permit.

1.5. Permitting Action

This is a reissuance of a KNDOP General Permit for Small and Medium AFOs operating no discharge agricultural waste handling systems and any associated land application areas. All prior versions of KNDOP will be superseded upon the issuance of this permit.

1.6. Definitions

Agricultural Wastes Handling System means a structure or equipment that conveys, stores, or treats manure from an animal feeding operation prior to land application.

Agriculture Water Quality Plan means a document incorporating the conservation plan, compliance plan, or forest stewardship management plan as necessary to prevent groundwater and surface water pollution from an agriculture operation.

Animal Feeding Operation (AFO) Animal feeding operation or "AFO" means a lot or facility, other than an aquatic animal production facility, that meets one (1) of the following descriptions:

(1)

- (a) "Large animal feeding operation"; or
- (b) "Medium animal feeding operation"; or
- (c) "Small animal feeding operation" and;

(2) If:

- (a) Animals other than aquatic animals, have been, are, or will be stabled or confined and fed or maintained for a total of forty-five (45) days or more in a twelve (12) month period; and
- (b) Crops, vegetation forage growth, or postharvest residues are not sustained in the normal growing season over any portion of the lot or facility.

Two (2) or more animal feeding operations under common ownership are considered to be a single animal feeding operation if they adjoin each other or if they use a common area or system for the disposal of wastes.

Best Management Practices (BMP) means, for agriculture operations, the most effective, practical, and economical means of reducing and preventing water pollution provided by the US Department of Agriculture, Natural Resources Conservation Service (NRCS) and the Kentucky Division of Conservation. Best management practices shall establish a minimum level of acceptable quality for planning, siting, designing, installing, operating, and maintaining these practices.

Concentrated Animal Feeding Operation (CAFO) means an AFO that is classified as either medium or large that discharges or intends to discharge pollutants into surface water. Any AFO can be designated as a CAFO upon determining that it is a significant contributor of pollutants to surface water regardless of the number or type of animals present. However, if an AFO does not discharge and does not intend to discharge, then the Cabinet shall not consider the AFO to be a CAFO in accordance with 401 KAR 5:005, Section 25(6).

Facility means a sewage system; except for septic tanks, pretreatment facilities regulated by an approved pretreatment program or inter-municipal agreement, and disposal wells as used in 401 KAR 5:090.

Kentucky No Discharge Operational Permit (KNDOP) means a permit issued pursuant to 401 KAR 5:005 for operating a wastewater treatment plant that does not have a discharge to a stream, including agricultural waste handling systems and spray irrigation systems.

Land Application means the uniform placement of animal waste on or in the soil by spraying or spreading on the surface, incorporation into the soil, or injection directly beneath the surface.

Large Animal Feeding Operation means an AFO that stables or confines as many as or more than the numbers of animals specified in any of the following categories:

- (1) 700 mature dairy cows, whether milked or dry
- (2) 1,000 veal calves
- (3) 1,000 cattle, other than mature dairy cows or veal calves, includes heifers, steers, bulls, cows or calf pairs
- (4) 2,500 swine, each weighing fifty-five (55) pounds or more
- (5) 10,000 swine, each weighing less than fifty-five (55) pounds
- (6) 500 horses
- (7) 10,000 sheep or lambs
- (8) 55,000 turkeys
- (9) 30,000 laying hens or broilers, if the AFO uses a liquid manure handling system

- (10) 125,000 chickens, other than laying hens, if the AFO uses other than a liquid manure handling system
- (11) 30,000 ducks, if the AFO uses other than a liquid manure handling system
- (12) 5,000 ducks, if the AFO uses a liquid manure handling system

Medium Animal Feeding Operation means an AFO that stables or confines the type and number of animals within any of the following ranges:

- (1) 200 to 699 mature dairy cows, whether milked or dry
- (2) 300 to 999 veal calves
- (3) 300 to 999 cattle, other than mature dairy cows or veal calves, includes heifers, steers, bulls, cows or calf pairs
- (4) 750 to 2,499 swine, each weighing fifty-five (55) pounds or more
- (5) 3,000 to 9,999 swine, each weighing less than fifty-five (55) pounds
- (6) 150 to 499 horses
- (7) 3,000 to 9,999 sheep or lambs
- (8) 16,500 to 54,999 turkeys
- (9) 9,000 to 29,999 laying hens or broilers, if the AFO uses a liquid manure handling system
- (10) 37,500 to 124,999 chickens, other than laying hens, if the AFO uses other than a liquid manure handling system
- (11) 25,000 to 81,999 laying hens, if the AFO uses other than a liquid manure handling system
- (12) 10,000 to 29,999 ducks, if the AFO uses other than a liquid manure handling system
- (13) 1,500 to 4,999 ducks, if the AFO uses a liquid manure handling system

Nutrient Management Plan (NMP) means the plan for an individual operation developed for the purpose of recycling nutrients from animal waste onto cropland or pasture.

Production area means that part of an AFO that includes the animal confinement area, the manure storage area, the raw materials storage area, and the waste containment areas. The animal confinement area includes but is not limited to open lots, housed lots, feedlots, confinement houses, stall barns, free stall barns, milkrooms, milking centers, cowyards, barnyards, medication pens, walkers, animal walkways, and stables. The manure storage area includes but is not limited to lagoons, runoff ponds, storage sheds, stockpiles, under house or pit storages, liquid impoundments, static piles, and composting piles. The raw materials storage area includes but is not limited to feed silos, silage bunkers, and bedding materials. The waste containment area includes but is not limited to settling basins, and areas within berms and diversions that separate uncontaminated storm water. Also included in the definition of production area is any egg washing or egg processing facility, and any area used in the storage, handling, treatment, or disposal of mortalities.

Sewage means the water-carried human or animal wastes from residences, buildings, or other places together with industrial wastes or underground, surface, storm or other water, as may be present.

Sewage System means individually or collectively those constructions or devices used for collecting, pumping, treating, and disposing of liquid or waterborne sewage, industrial waste, or other wastes.

Small Animal Feeding Operation means an AFO not classified as either medium or large AFO.

Surface Water means those waters having well-defined banks and beds either constantly or intermittently flowing; lakes and impounded waters; marshes and wetlands; and any subterranean waters flowing in well-defined channels and having a demonstrable hydrologic connection with the surface. Lagoons used for waste treatment and effluent ditches that are situated on property owned, leased, or under valid easement by a permitted discharger are not considered surface waters of the Commonwealth.

Water or Waters of the Commonwealth means and includes any and all rivers, streams, creeks, lakes, ponds, impounding reservoirs, springs, wells, marshes, and all other bodies of surface or underground water, natural or artificial, situated wholly or partly within or bordering upon the Commonwealth or within its jurisdiction.

Wastewater Treatment Plant (WWTP) means a facility used for the treatment and disposal of sewage.

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SECTION 2
PERMIT CONDITIONS AND
JUSTIFICATION

2. PERMIT CONDITIONS

2.1. Specific Conditions

The following conditions apply to the management of animal wastes produced at Small and Medium Animal Feeding Operations (AFOs). Pursuant to 401 KAR 5:005, Section 25 these conditions are, in the best professional judgment of the cabinet, necessary to comply with the requirements of KRS Chapter 224 and 401 KAR Chapters 4 through 11.

- 1) This permit authorizes operation of a facility that does not discharge and does not intend to discharge to Waters of the Commonwealth, including agricultural waste handling systems and facilities that dispose of effluent by spray irrigation as described in the permit application.
- 2) There shall be no point source discharge of wastewater from the facility to Waters of the Commonwealth.
- 3) Land application shall be of a sufficiently low rate as to prevent any runoff to Waters of the Commonwealth.
- 4) Land application activities shall not occur on snow covered, frozen, or saturated ground, or during precipitation events.
- 5) Closure of a lagoon shall be in accordance with the requirements of 401 KAR 5:005, Section 3(3)(a)2 and 3.
- 6) In accordance with KRS 224.71-100 through 224.71-145, the facility shall develop and implement a site-specific Agricultural Water Quality Plan (AWQP). DOW is not requiring submission of the AWQP as part of the application requirements. However, the permittee shall provide the AWQP upon request by the Division of Water.
- 7) In accordance with 401 KAR 5:005, Section 25 (1) an animal feeding operation (AFO) shall have a Nutrient Management Plan (NMP) consistent with the Agriculture Water Quality Act, KRS 224.71 – 100 through 224.71-145, and the NRCS Conservation Practice Standard Code 590 for Kentucky. DOW is not requiring submission of the NMP as part of the application requirements. However, the permittee shall provide the NMP upon request by DOW.
- 8) 401 KAR Section 25(6) states if an animal feeding operation does not discharge, does not intend to discharge, and obtains a Kentucky No-Discharge Operational Permit, then the cabinet shall not consider the animal feeding operation a Concentrated Animal Feeding Operation. Intake Waters – Nearest Downstream Intake

2.2. Nutrient Management Plan

The primary purpose of the Nutrient Management Plan is to achieve the correct nutrient level (nitrogen and phosphorus) needed to grow the planned crop by balancing nutrients already in the soil with nutrients in animal waste that is land applied. The NMP should prevent the application of nutrients at rates that will exceed the capacity of the soil and crops to assimilate them.

In accordance with 401 KAR 5:005, Section 25(1), permittee shall develop a Nutrient Management Plan that meets the requirements of The Natural Resources Conservation Service (NRCS), Conservation Practice Standard Code 590 for Kentucky.

The permittee shall maintain a copy of the NMP on site and shall make the plan available to representatives of the Division of Water upon request. The plan shall contain a statement certifying that the NMP meets all applicable permit requirements and the permittee must sign the plan.

The permittee shall amend the NMP whenever there is a change in the facility or change in the operation of the facility that materially increases the potential for the release of pollutants.

If at any time following the issuance of this permit, the NMP is found to be inadequate pursuant to a state or federal site inspection or plan review, the plan shall be modified to incorporate such changes necessary to correct the inadequacy.

The NMP shall also include a description of the following practices that address the requirements found in 401 KAR 5:005 Section 25 (2).

- 1) Adequate storage of manure, litter, and process wastewater, including procedures to ensure proper operation and maintenance of the storage facilities;
- 2) Proper management of animal mortalities to ensure that they shall not be disposed of in liquid manure, storm water, or process wastewater storage or treatment system;
- 3) Method to ensure clean water shall be diverted from the production area;
- 4) System to prevent direct contact of confined animals with Waters of the Commonwealth;
- 5) Management of chemicals and other contaminants handled on-site to ensure they shall not be disposed in manure, litter, process wastewater, or storm water storage or treatment system, unless specifically designed to treat chemicals and other contaminants;
- 6) Site-specific conservation practices to be implemented to control runoff of pollutants to waters of the Commonwealth;
- 7) Protocols for testing of manure, litter, process wastewater, and soil;
- 8) Protocols to land apply manure, litter, or process wastewater in accordance with site-specific nutrient management practices that ensure agricultural utilization of the nutrients in the manure, litter, or process wastewater; and
- 9) Records to document the implementation and management of the elements described in (1) through (8) of this section.

Facilities that have requested cost share funding through USDA Natural Resource Conservation Service may be required to develop a NMP that meets Federal requirements. If all the components of a NMP required by this permit are incorporated into the Federal plan, then a separate NMP is not necessary for this permit.

2.3. Additional Measures for Animal Feeding Operations

In accordance with 401 KAR 5:005, Section 25(3), permittee shall implement the following requirements.

- 1) Visual inspections. There shall be routine visual inspections of the production area. The following shall be visually inspected:
 - (a) Weekly inspections of all storm water diversion devices, runoff diversion structures, and devices channeling contaminated storm water to the wastewater and manure storage and containment structure;
 - (b) Daily inspections of drinking water or cooling water lines; and
 - (c) Weekly inspections of the manure, litter, and process wastewater impoundments. The inspection shall note the level in liquid impoundments as indicated by the depth marker.
- 2) Depth marker. An open surface liquid impoundment shall have a depth marker that clearly indicates the storage capacity.
- 3) Corrective actions. A deficiency found as a result of an inspection shall be corrected.
- 4) Mortality handling. A mortality shall not be disposed of in liquid manure or process wastewater system and shall be handled in a way that prevents the discharge of pollutants to surface water.

2.4. Record Keeping Requirements for the Production Area

In accordance with 401 KAR 5:005, Section 25(4) each AFO shall maintain on-site, for a period of five (5) years from the date they are created, a complete copy of the information required in the NMP and the records specified below. The AFO shall make these records available to DOW for review upon request.

- 1) Records documenting the inspections required pursuant to 401 KAR 5:005, Section 25(3);
- 2) Weekly records of the depth of the manure and process wastewater in the liquid impoundment as indicated by the depth marker;
- 3) Records documenting an action taken to correct deficiencies required pursuant to subsection (3)(c) of this section. Deficiencies not corrected within thirty (30) days shall be accompanied by an explanation of the factors preventing immediate correction;
- 4) Records of mortalities management and practices used by the AFO to meet the requirements of subsection (3)(d) of this section;

- 5) Records documenting the current design of manure or litter storage structures, including volume for solids accumulation, design treatment volume, total design volume, and approximate number of days of storage capacity; and
- 6) Records of the date, time, and estimated volume of any overflow.

2.5. Record Keeping Requirements for the Land Application Areas

In accordance with 401 KAR 5:005, Section 25(5) each AFO shall maintain on-site the following documents.

- 1) Each AFO shall maintain on-site a copy of its site-specific Nutrient Management Plan.
- 2) Each AFO shall maintain on-site for a period of five (5) years from the date it was created a complete copy of the information required by the permit application Short Form B, the information required by the Nutrient Management Plan, and the records specified for Production Area and Land Application Areas.
- 3) The AFO shall make these records available to DOW for review upon request.
 - (a) Expected crop yields;
 - (b) The date manure, litter, or process waste water is applied to each field;
 - (c) Weather conditions at time of application and for twenty-four (24) hours prior to and following application;
 - (d) Test methods used to sample and analyze manure, litter, process waste water, and soil;
 - (e) Results from manure, litter, process waste water, and soil sampling;
 - (f) Explanation of the basis for determining manure application rates, as provided in the NRCS Conservation Standard Practice Code 590 for Kentucky;
 - (g) Calculations showing the total nitrogen and phosphorus to be applied to each field, including sources other than manure, litter, or process wastewater;
 - (h) Total amount of nitrogen and phosphorus applied to each field, including documentation of calculations for the total amount applied;
 - (i) The method used to apply the manure, litter, or process wastewater; and
 - (j) Each date of manure application and equipment inspection.

2.6. Standard Conditions

- 1) Coverage shall be subject at all times to revocation or modification by the Kentucky Energy and Environment Cabinet as set forth in Kentucky Revised Statutes (KRS) 224 10-100. Commencement of a routine point source discharge shall result in permit revocation.
- 2) The permit authorizes operation only of the WWTP described in the permit in the manner and under the conditions described in the permit application and supporting documents as approved by the cabinet in the permit.
- 3) This permit shall not be construed as authorizing an operation that is otherwise in contravention of a statute, administrative regulation, ordinance or order of a governmental unit.
- 4) This permit shall not be construed as authorizing the creation or maintenance of a nuisance
- 5) Any spill or discharge to Waters of the Commonwealth shall be reported to the Department for Environmental Protection with 24 hours by calling the appropriate Division of Water Regional Office or if after hours the Cabinet's Environmental Response Line at 1 (800) 928-2380.
- 6) This permit has been issued under the provisions of KRS Chapter 224 and 401 KAR Chapters 4 through 11.
- 7) Issuance of the permit shall not relieve the permittee from the responsibility of obtaining any other permits or licenses required by the cabinet and other state, federal, and local agencies.
- 8) If applicable, the waste materials removed from a settling basin shall be disposed of according to the requirements of the Division of Waste Management in 401 KAR Chapters 30 through 49.
- 9) Land application that results in runoff to a stream shall be prohibited.

SECTION 3

APPLICATION REQUIREMENTS

3. PERMIT APPLICATION REQUIREMENTS

Short Form B (Form DEP 7033-B-ND or equivalent electronic form) is required to apply for coverage under this permit. The applicant shall submit the form and a US Geological Survey 7.5-minute quadrangle map with the facility location clearly marked. Short Form B requires the following information (see form for details):

- 1) General Information
- 2) Facility Description
- 3) Source and Destination of Wastes
- 4) Certification

Completed Short Form B's shall be submitted to the Division of Water, Surface Water Permits Branch.

SECTION 4

OTHER CONDITIONS

4. OTHER CONDITIONS

4.1. Authorization to Operate

The applicant is authorized to operate under the terms and conditions of this permit upon written notification of coverage by the DOW.

4.2. Schedule of Compliance

The permittee will comply with all effluent limitations by the effective date of the permit except as specified below [401 KAR 5:070, Section 2 – 40 CFR 122.47].

4.3. Other Requirements

Operations authorized by this permit shall remain consistent with those described on the permit application. An updated Short Form B shall be submitted if the permittee changes type of livestock or the maximum number of animals authorized by this permit. An updated Short Form B is also required for any changes in the method or area of waste storage, final disposition, or land application. After reviewing the updated Short Form B, DOW may require the permittee to submit an application for an individual permit.

4.4. Permit Transfers

If a permitted facility changes owners, the new operator must submit a Change of Ownership Form (Form DEP 7032-CO) to DOW in order to transfer this permit. Permit transfers are only permissible when there are no operational changes.

4.5. Permit Duration

This permit shall have duration of five (5) years from effective date unless modified or reissued.

4.6. Continuation of Coverage

If this General Permit expires prior to reissuance by DOW those medium or small AFOs that have received authorization shall be administratively continued until reissuance of the General Permit. New coverages shall not be granted until the General Permit is reissued.

4.7. Permit Information

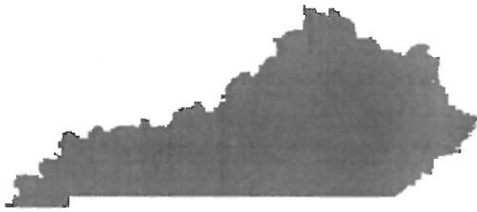
The permit and fact sheet are available on the Department of Environmental Protection's Issued Approvals Search web page at:

http://dep.gateway.ky.gov/eSearch/Search_Issued_Approvals.aspx

4.8. References and Cited Documents

All material and documents referenced or cited in this fact sheet are parts of the permit information as described above and are readily available at the Division of Water Central Office. Information regarding these materials may be obtained from the Division of Water's Open Records Coordinator at (502) 564-3410 or by e-mail at DEP.KORA@ky.gov.

KPDES



KENTUCKY POLLUTANT
DISCHARGE ELIMINATION
SYSTEM

PERMIT

AI NO.: 35050

**AUTHORIZATION TO OPERATE UNDER THE
KENTUCKY NO DISCHARGE OPERATIONAL PERMIT (KNDOP) SYSTEM**

Pursuant to Authority in KRS 224,

Small and Medium Animal Feeding Operations that meet the eligibility requirements of this general permit

are authorized to operate agricultural waste handling systems and any land application areas located

within the 120 counties of the Commonwealth of Kentucky

in accordance with all the requirements and other conditions set forth in this permit.

This permit shall become effective on October 1, 2016.

This permit and the authorization to discharge shall expire at midnight, September 30, 2021.

September 22, 2016

Date Signed

A handwritten signature in cursive script that reads "Peter T. Goodmann".

Peter T. Goodmann, Director

Division of Water

**DEPARTMENT FOR ENVIRONMENTAL PROTECTION
Division of Water, 300 Sower Boulevard, Frankfort, Kentucky 40601**

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THIS KPDES PERMIT CONSISTS OF THE FOLLOWING SECTIONS.

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SECTION 1
PERMIT CONDITIONS

1. Permit Conditions

1.1. Specific Conditions

The following conditions apply to the management of animal wastes produced at Small and Medium Animal Feeding Operations (AFOs). Pursuant to 401 KAR 5:005, Section 25 these conditions are, in the best professional judgment of the cabinet, necessary to comply with the requirements of KRS Chapter 224 and 401 KAR Chapters 4 through 11.

- 1) This permit authorizes operation of a facility that does not discharge and does not intend to discharge to Waters of the Commonwealth, including agricultural waste handling systems and facilities that dispose of effluent by spray irrigation as described in the permit application.
- 2) There shall be no point source discharge of wastewater from the facility to Waters of the Commonwealth.
- 3) Land application shall be of a sufficiently low rate as to prevent any runoff to Waters of the Commonwealth.
- 4) Land application activities shall not occur on snow covered, frozen, or saturated ground, or during precipitation events.
- 5) Closure of a lagoon shall be in accordance with the requirements of 401 KAR 5:005, Section 3(3)(a)2 and 3.
- 6) In accordance with KRS 224.71-100 through 224.71-145, the facility shall develop and implement a site-specific Agricultural Water Quality Plan (AWQP). DOW is not requiring submission of the AWQP as part of the application requirements. However, the permittee shall provide the AWQP upon request by the Division of Water.
- 7) In accordance with 401 KAR 5:005, Section 25(1) an animal feeding operation (AFO) shall have a Nutrient Management Plan (NMP) consistent with the Agriculture Water Quality Act, KRS 224.71 – 100 through 224.71-145, and the NRCS Conservation Practice Standard Code 590 for Kentucky. The permittee shall provide the NMP upon request by DOW.
- 8) An AFO that does not discharge, does not intend to discharge, and obtains a Kentucky No Discharge Operational Permit shall not be considered a Concentrated Animal Feeding Operation.

1.2. Nutrient Management Plan

The permittee shall maintain a copy of the NMP on site and shall make the plan available to representatives of DOW upon request. The plan shall contain a statement certifying that the NMP meets all applicable permit requirements and the permittee must sign the plan.

The permittee shall amend the NMP whenever there is a change in the facility or change in the operation of the facility that materially increases the potential for the release of pollutants.

If at any time following the issuance of this permit, the NMP is found to be inadequate pursuant to a state or federal site inspection or plan review, the plan shall be modified to incorporate such changes necessary to correct the inadequacy.

The NMP shall also include a description of the following practices that address the requirements found in 401 KAR 5:005 Section 25 (2). Records shall be maintained by the permittee documenting the implementation and management of the practices below.

- 1) Adequate storage of manure, litter, and process wastewater, including procedures to ensure proper operation and maintenance of the storage facilities;
- 2) Proper management of animal mortalities to ensure that they shall not be disposed of in liquid manure, storm water, or process wastewater storage or treatment system;
- 3) Method to ensure clean water shall be diverted from the production area;

- 4) System to prevent direct contact of confined animals with Waters of the Commonwealth;
- 5) Management of chemicals and other contaminants handled on-site to ensure they shall not be disposed in manure, litter, process wastewater, or storm water storage or treatment system, unless specifically designed to treat chemicals and other contaminants;
- 6) Site-specific conservation practices to be implemented to control runoff of pollutants to waters of the Commonwealth;
- 7) Protocols for testing of manure, litter, process wastewater, and soil;
- 8) Protocols to land apply manure, litter, or process wastewater in accordance with site-specific nutrient management practices that ensure agricultural utilization of the nutrients in the manure, litter, or process wastewater; and
- 9) Records to document the implementation and management of the elements described in (1) through (8) of this section.

Facilities that have requested cost share funding through USDA Natural Resource Conservation Service may be required to develop a NMP that meets Federal requirements. If all the components of a NMP required by this permit are incorporated into the Federal plan, then a separate NMP is not necessary for this permit.

1.3. Additional Measures for Animal Feeding Operations

In accordance with 401 KAR 5:005, Section 25(3), permittee shall implement the following requirements.

- 1) There shall be routine visual inspections of the production area. The following shall be visually inspected:
 - (a) Weekly inspections of all storm water diversion devices, runoff diversion structures, and devices channeling contaminated storm water to the wastewater and manure storage and containment structure;
 - (b) Daily inspections of drinking water or cooling water lines; and
 - (c) Weekly inspections of the manure, litter, and process wastewater impoundments. The inspection shall note the level in liquid impoundments as indicated by the depth marker.
- 2) An open surface liquid impoundment shall have a depth marker that clearly indicates the storage capacity.
- 3) A deficiency found as a result of the permittee's inspection shall be corrected.
- 4) A mortality shall not be disposed of in liquid manure or process wastewater system and shall be handled in a way that prevents the discharge of pollutants to surface water.

1.4. Recordkeeping Requirements for the Production Area

In accordance with 401 KAR 5:005, Section 25(4) each AFO shall maintain on-site, for a period of five (5) years from the date they are created, a complete copy of the information required in the NMP and the records specified below. The AFO shall make these records available to DOW for review upon request.

- 1) Records documenting inspections;
- 2) Weekly records of the depth of the manure and process wastewater in the liquid impoundment as indicated by the depth marker;
- 3) Records documenting an action taken to correct deficiencies. Deficiencies not corrected within thirty (30) days shall be accompanied by an explanation of the factors preventing immediate correction;
- 4) Records of mortalities management and practices used by the AFO;
- 5) Records documenting the current design of manure or litter storage structures, including volume for solids accumulation, design treatment volume, total design volume, and approximate number of days of storage capacity; and
- 6) Records of the date, time, and estimated volume of any overflow.

1.5. Recordkeeping Requirements for the Land Application Areas

In accordance with 401 KAR 5:005, Section 25(5) each AFO shall maintain on-site the following documents.

- 1) Each AFO shall maintain on-site a copy of its site-specific Nutrient Management Plan.
- 2) Each AFO shall maintain on-site for a period of five (5) years from the date it was created a complete copy of the information required by the permit application Short Form B, the information required by the Nutrient Management Plan, and the records specified for Production Area and Land Application Areas.
- 3) The AFO shall make these records available to DOW for review upon request.
 - (a) Expected crop yields;
 - (b) The date manure, litter, or process waste water is applied to each field;
 - (c) Weather conditions at time of application and for twenty-four (24) hours prior to and following application;
 - (d) Test methods used to sample and analyze manure, litter, process waste water, and soil;
 - (e) Results from manure, litter, process waste water, and soil sampling;
 - (f) Explanation of the basis for determining manure application rates, as provided in the NRCS Conservation Standard Practice Code 590 for Kentucky;
 - (g) Calculations showing the total nitrogen and phosphorus to be applied to each field, including sources other than manure, litter, or process wastewater;
 - (h) Total amount of nitrogen and phosphorus applied to each field, including documentation of calculations for the total amount applied;
 - (i) The method used to apply the manure, litter, or process wastewater; and
 - (j) Each date of manure application and equipment inspection.

1.6. Standard Conditions

- 1) Coverage shall be subject at all times to revocation or modification by the Kentucky Energy and Environment Cabinet as set forth in Kentucky Revised Statutes (KRS) 224 10-100. Commencement of a routine point source discharge shall result in permit revocation.
- 2) The permit authorizes operation only of the WWTP described in the permit in the manner and under the conditions described in the permit application and supporting documents as approved by the cabinet in the permit.
- 3) This permit shall not be construed as authorizing an operation that is otherwise in contravention of a statute, administrative regulation, ordinance or order of a governmental unit.
- 4) This permit shall not be construed as authorizing the creation or maintenance of a nuisance.
- 5) Any spill or discharge to Waters of the Commonwealth shall be reported to the Department for Environmental Protection with 24 hours by calling the appropriate Division of Water Regional Office or if after hours the Cabinet's Environmental Response Line at 1 (800) 928-2380.
- 6) This permit has been issued under the provisions of KRS Chapter 224 and 401 KAR Chapters 4 through 11.
- 7) Issuance of the permit shall not relieve the permittee from the responsibility of obtaining any other permits or licenses required by the cabinet and other state, federal, and local agencies.
- 8) If applicable, the waste materials removed from a settling basin shall be disposed of according to the requirements of the Division of Waste Management in 401 KAR Chapters 30 through 49.

- 9) Land application that results in runoff to a stream shall be prohibited.

SECTION 2
OTHER CONDITIONS

2. Other Conditions

2.1. Authorization to Operate

The permittee shall construct the facility in compliance with the plans submitted to DOW, and shall operate the facility in compliance with all the terms and conditions of this permit.

2.2. Compliance Schedule

The permittee shall attain compliance with all requirements of this permit on the effective date of this permit unless otherwise stated.

2.3. Other Requirements

Operations authorized by this permit shall remain consistent with those described on the permit application. An updated Short Form B shall be submitted if the permittee changes type of livestock or the maximum number of animals authorized by this permit. An updated Short Form B is also required for any changes in the method or area of waste storage, final disposition, or land application. After reviewing the updated Short Form B, DOW may require the permittee to submit an application for an individual permit.

Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal, and local agencies.

2.4. Permit Transfers

If a permitted facility changes owners, the new operator must submit a Change of Ownership Form (Form DEP 7032-CO) to the DOW in order to transfer this permit. Permit transfers are only permissible when there are no operational changes.

2.5. Permit Terminations

If an AFO is no longer in operation and the agricultural waste handling system is no longer used and has been properly closed, then the permittee may terminate this permit by submitting a written request to do so.

2.6. Permit Duration

This permit shall have duration of five (5) years from effective date unless modified or reissued.

2.7. Continuation of Coverage

If this General Permit expires prior to reissuance by DOW those medium or small AFOs that have received authorization shall be administratively continued until reissuance of the General Permit. New coverages shall not be granted until the General Permit is reissued.

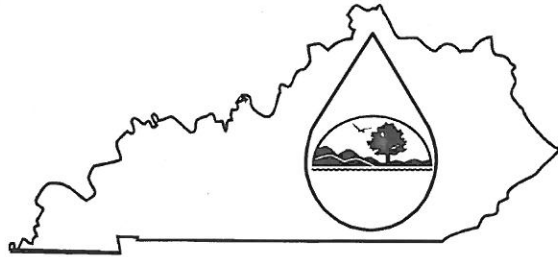
2.8. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved in accordance with 401 KAR 5:050 through 5:080, if the effluent standard or limitation so issued or approved:

- 1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
- 2) Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of KRS Chapter 224 when applicable.

SHORT FORM B



Kentucky No Discharge
Operational Permit Application
for Agricultural Wastes
Handling System

For additional information, contact Surface Water Permits Branch, (502) 564-3410.

This is an application to:

- 1. Apply for a new operational permit
- 2. Apply for reissuance of expiring operational permit
- 3. Apply for a construction permit
(Attach design criteria)

(Check one)

KNDOP NUMBER (AGENCY USE ONLY)															
I. GENERAL INFORMATION															
Applicant Name:															
Mailing Address:															
City, State, Zip Code:															
Area Code + Telephone No.:															
II. FACILITY DESCRIPTION (Location)															
Facility Name															
Standard Industrial Classification (SIC) Code and Description: (Please check one)															
<input type="checkbox"/> 0241 – Dairy Farm		<input type="checkbox"/> 0213 - Hog Farm		<input type="checkbox"/> 0212 - Beef Farm		<input type="checkbox"/> 0251 ,0252 – Poultry Farm		<input type="checkbox"/> 0291 - Other							
Location Address															
City, State Zip Code															
County where facility is located:															
<p>Attach a US Geological Survey 7 ½-minute quadrangle map for the site with the facility clearly marked. USGS maps may be obtained from the Kentucky Geological Survey, University of Kentucky, Mines and Minerals Building, Room 104, Lexington, KY 40506 or by phone at (859) 257-3896.</p>															
Facility Latitude (d/m/s)								Facility Longitude (d/m/s)							

III. SOURCE AND DESTINATION OF WASTES

Indicate the number of animals the facility is currently supporting or plans to support in the Table below.

Type of Animals (include approximate live weight per animal)	Number of Animals
Total:	

Current or planned method of waste storage: (Holding Pond, Holding Tank, Stack Pad, etc.)	
Approximate number of acres available for land application of wastes:	
Is this a medium or a large animal feeding operation? No <input type="checkbox"/> Yes <input type="checkbox"/> If yes, attach nutrient management plan.	
Comments:	

IV. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PRINTED OR TYPED NAME OF Person Signing	
TITLE	
DATE SIGNED	
SIGNATURE:	

Return completed application form and attachments to: **Surface Water Permits Branch, Division of Water, 200 Fair Oaks Lane, Frankfort, KY 40601. Direct questions to: Surface Water Permits Branch at (502) 564-3410.**