Process Improvement – Principles & Practices for Implementation

by Dick Wittman

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Biosketch

- Ag Lender – FCS (1972-1980) – Spokane, WA & Washington, DC
- Partner in 20,000 acre diversified family farm business (1980-present)
  - ***New title – Jan. 1, 2017 – Board Chairman/Transition Coach***
- Farm management consultant (1980-present)
  - Farm family transitions and formalization of governance structures, financial planning, managerial accounting, process improvement, consultant training
- Industry boards/affiliations
  - Farm Financial Standards Council – Past President
  - PNW Direct Seed Association – Founding Director, Past President
  - Director – numerous commodity group and bank boards
  - Faculty member – TEPAP Program (fin mgmt. & process improvement); Texas A&M King Ranch Institute (MA)

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IQ Test – What do following have to do with Process Improvement?

- Tractor rollover – flat tire (no fluid); spraying on steep ground; no seat belt; roll bar taken off
- Skidder kills operator – 500’ slope; no seat belt
- Employee gets caught spraying ineligible chemical near creek
- Combine kills grandpa (SK 2010) – grandson kid hits button in cab; 2nd wife sells farm defying sons farm plans
- Fuel spill – employee fueling implement with auto-shutoff nozzle leaves scene; nozzle fails; big MESS!
- Employee talking on cell phone while winging out self-propelled sprayer – hits power lines & fries tires!
- Employee talking on cell phone; tips logging truck over!

Answer …When you have:

No clearly defined company culture for:

- Documenting and following SOPs
- Auditing Process Improvement objectives
- Rewarding/incentivizing improvements

→ Bad things happen!

CLASS EXERCISE

Identify situations in past 12 months where a process in your operation could have benefited from a more standardized operating procedure …

Case Studies – #1 – Grain Hauling Efficiency

- Problem: 7 semis; under-loading trucks 40 bu./trip
- Analysis
  - Opportunity cost = $.15/bu. x 40 bu/trip = $6.00/trip
  - 6 loads/day x 45 days @ $6.00/trip x 7 trucks = $11,340/yr

  → 5% cost reduction => 5% reduction in trucking needs

  → Motivator: Port of Entry fines → $100-500/overload
- Solution/Options:
  - Grain wagon electronic scale - $3,250 + $1,500 install

    → Payback in ½ season of harvest!!!
  - Electronic scales – each truck (ok for commercial hauler)

Agenda

- What is “process management”
- Motivation and rewards for excellence
- Consequences when you are lax
- Models, Applications and Case Studies for putting concepts into practice

100 Yr History of Process Improvement

Resource providers doing it for years…never had a Harvard MBA term for it!

- Scientific Engineering – Frederick Taylor (1911) – summarizes 30 years of study in steel industry
- 1st exposure to term – ***Cheaper by the Dozens***
  - Movie about time and motion studies - Frank Gilbreth
- Total Quality Management (1980's) → Six Sigma → Business Process Re-engineering → Business Process Re-design… and dozens of other buzzwords
- Bottom Line: deciding what to **measure & manage**

Pig Iron Case Study

Principles applied to steel millworkers handling pig iron.

→Assessed motions, capacity of workers

→Developed process, picked 1st class handlers

- Baseline – workers loaded 12 ½ tons of steel /day
- Results–
  - handled 47 T/day – ↑ productivity 400%
  - Worker pay ↑ 60% ($1.15 → $1.85/day)
  - Cost of production dropped 56% ($.072 → $.033/T)

Frank Gilbreth – father of "Time & Motion Studies"

- Studied motions of bricklayers
  - reduced movements from 18 to 5
  - positioned materials, support systems for maximum efficiency
- **Results**
  - 350 bricks/hour vs. 120 industry average
  - Bricklayers selected based on performance; given substantial pay increases

  →***Gilbreth's techniques still used today to increase efficiency.***

"Laid 800,000 bricks at college health science building = $54,300 ↓ (54.3% lower cost); 49% less time to complete project.

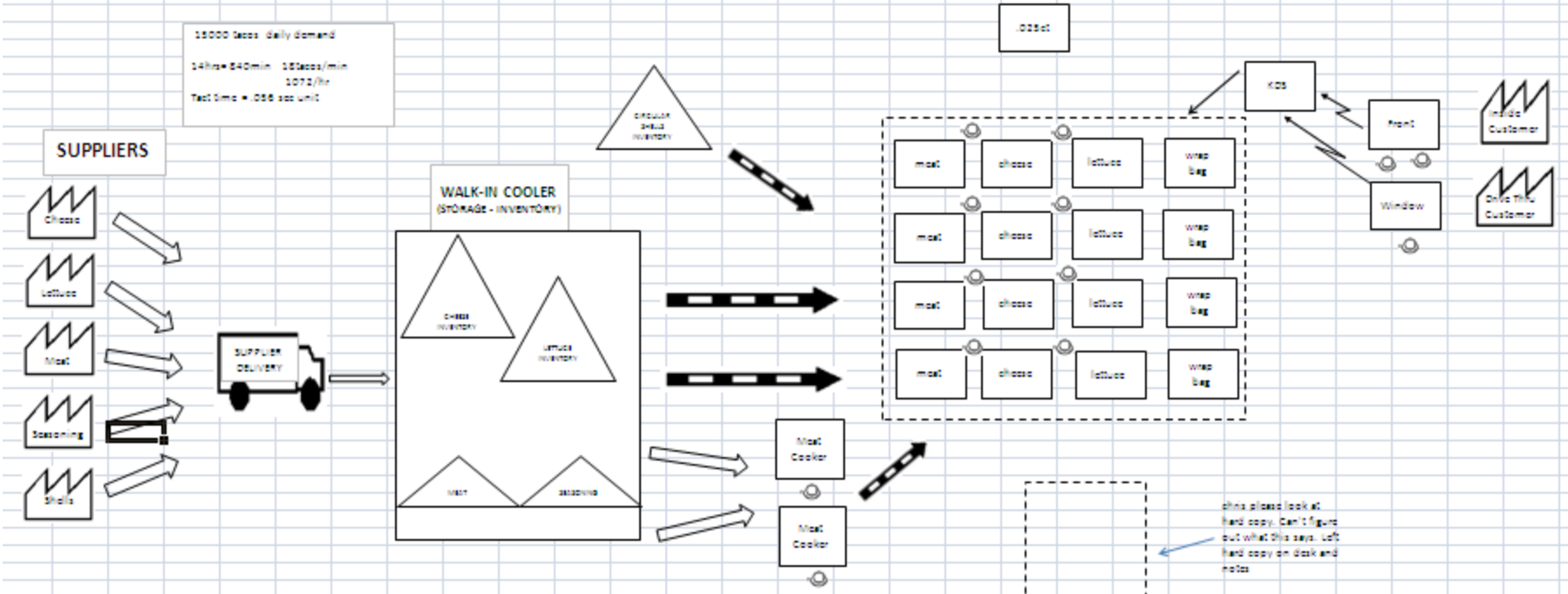
MODERN APPLICATIONS OF PROCESS IMPROVEMENT SUCCESSES

Health care/pharmacy, fast foods, seeding systems, dairy, timber harvesting, crop production

Happy Days Corp

Meet my friend Bruce Finch
Fast Food Vendor *par excellence!*

- Multiple Taco Time outlets
- Observed time from order window to departure …*not happy!*
- Challenged staff to identify solutions…gave $ incentives
- Sets new records annually for volume, speed, quality
- Exemplifies lifetime commitment to Process Improvement
- Project: engaged Time/Motion team to study Cinco de Mayo



Imagine clock like this in your shop, drill or sprayer!

Strategy/Results
Take homes

- Digital timers track time from order to handing food out window
- Tracked average & best times; employees *continually* worked to BEAT times
- Incentives given for efficiency
- RESULTS
  - Doubled taco output over 2 years
  - Dropped labor cost per taco 13%

CINCO 2009

CINCO THIS YEAR TOOK PLACE ON A TUESDAY.

	LTT	CTT	MTT	TOTAL
NET SALES	[redacted]			
LABOR	16.71%	16.62%	18.36%	
TACO'S SOLD	6896	6098	3406	16400
% OF SALES	46.63%	46.51%	43.00%	
BONUS HOURS	5	5	5	15
RECORD HOURS	[redacted]		0	

CINCO 2011

CINCO THIS YEAR TOOK PLACE ON A Thursday

	LTT	CTT	MTT	TOTAL
NET SALES	[redacted]			
LABOR	15.71%	16.36%	16.03%	
TACO'S SOLD	13854	12000	5300	31154
% OF SALES	58.00%	59.10%	46.70%	
BONUS HOURS	7	9	8	24
RECORD HOURS	[redacted]		0	

"…to increase efficiency, workers and management must both know performance can be improved. Keeping records of past and present performance very important." *Bruce Finch, Owner*

Milking Robots

Landry Brothers Dairy, St Albert, Quebec
Source: JD Furrow

Three shifts of workers replaced with 10 robots @ $200,000

- lower mastitis
- less management stress
- more attractive to young workers
- 10% increase in milk production
- better insemination results

"…robots don't take holidays or call in sick, never get tired, lose focus or have a bad day…and they NEVER FORGET important things about each cow…like how many times a day a cow needs to be massaged!"

Agricultural Gains from Process Improvement

- Conversion to NoTill/Direct Seeding
- Harvest operations–combine and trucks
- Hay harvesting/hauling
- Grain transportation – trucks, unit trains
- Self-propelled sprayers
- Timber harvesting

A Tale of Two Tillage Systems

	1998	2000
ATR	.50	1.05
OPMR	.1275	.1633
ROA	6.47%	17.14%
ROE	3.88%	22.61%

Timber Harvest Efficiency Trends

- Horse logging
- Dozers with winches
- Skidders
- Faller-bunchers
- Stroker/delimbers

2-3 loads/day

9 loads/day

Process Improvement – Wittman Farms

Baseline - 1980

- 6 partners, 2,500 ac farm, 2,500 pasture, BIG crew
- 4 combines; 6 trucks
- Farming implements covered ground 6-8 times/year

Today

- 4 partners, 20,000 acres
- 100% Direct Seeded
- Efficiency compared to 1980
  - 1 combine replaces 6
  - 1 semi replaces 4-2T tks
  - Sprayer = “8x” acres/day

Dick's Definition:

Process Improvement is…

- Identifying jobs that are repetitive
- Documenting how jobs are supposed to be performed (SOP, GAP, BMP)
- Evaluating how to **do it *better:***
  - ***More Efficient***
  - ***Safer***
  - ***More Economical, and***
  - ***Environmentally sustainable***
- Auditing how you're doing & rewarding gains

Where can Process Improvement be applied?

… and how do we put principles into practice?

SOP's, GAPs*, BMPs*

16% have SOPs in place!

What are they? guidance documents and standards for repetitious or routine jobs

How are they used?

- Training – new hires
- Leverage communication for multiple employees
- Assures jobs done following BMPs, GAPs
- Increases safety & lowers cost of production
- Basis for measuring job performance, auditing
- Accessing markets, value-added premiums

GAP=Good Agricultural Practice; BMP=Best Management Practice

Consequences of Undocumented SOPs

- Inconsistent work
- Accidents
- Inefficient processes
- Food safety hazards → health risks, fines
- Market demand destruction & loss of market access
- Excessive turnover

Areas to Apply SOPs/GAPs

- Office functions
- Harvest operations & servicing
- Crop agronomic practices
- Timber harvest & manufacturing processes
- Fuel and Supply Storage
- Worker safety guidelines
- Food safety practices
- Herd health & stock handling procedures
- Value added market access

Office Management Functions

- Database management
- Computer access protocols
- Internal controls/security
- Data Backups
- Network and internet
- Financial function SOPs

Equipment Operations & Servicing

- Maintenance checklists
- Operating instructions – key equipment
- Shop protocols
- Seasonal work flow planning
- Harvest crew orientation
- On farm grain storage protocols

Chassis Checklist

Imagine fleet of trucks…

How avoid the "…dreaded phone call"

"Are you SURE you checked everything?"

Power Unit Chassis Checklist

Date - _____ Unit# - _____ Mileage - _____ Hours - _____

Ser# - _____ Make - _____ Model - _____ Inspector - _____

OK	*Repair*	
		Electrical -
☐	☐	Headlights, high & low beam.
☐	☐	Signal lights, front and rear.
☐	☐	Clearance, tail, and marker lights.
☐	☐	Inspect alternator pulley, belts and mounting.
☐	☐	Take a voltage reading at alternator before and after starting.
☐	☐	Inspect condition of battery, cleanliness, terminal ends, etc.
☐	☐	Inspect battery cables to starter, bare spots, rubbing, etc.
☐	☐	Check cab service, horn, heater, instrument and lights, etc.
☐	☐	Inspect and tie up any loose, rubbing or dangling wires.
		Chassis Inspection -
☐	☐	Jack up front axle and place on jack stands.
☐	☐	Check kingpins; grease until lower bearing is purged.
☐	☐	Check condition of front wheel bearings, wheels and nuts.
☐	☐	Check the condition of the steering gear, draglink and tie rod ends.
☐	☐	Inspect front spring eye, pin, U bolts, nuts and rear mounts.
☐	☐	Inspect this area closely for any rust stains tracking away from any two surfaces indicating movement.
☐	☐	Check front motor mount cross member, insulators and bolts.
☐	☐	Check tire pressure and inspect steering axle tires.
☐	☐	Set front end back on the ground, start engine and turn steering right to left while looking for steering gear mounting, steering stops, front axle and spring movement.
☐	☐	Check all cross members for cracks and loose bolts.
☐	☐	Inspect torque arm condition and mounting.
☐	☐	Inspect end beam bushings and check pin and bolt assemblies.
☐	☐	Torque end beam bushing bolts to 225 ft. lbs.
☐	☐	Inspect center bushing, mounting caps and dead axle.
☐	☐	Inspect rear spring packs, extended leafs and brakes.
☐	☐	On spring suspensions, be sure to purge grease pin.
☐	☐	On bisquit suspension, set on jack stands and check wheel bearings, tire condition, pressure and wheel nuts.
☐	☐	While suspension is OFF the ground, rotate one wheel on front axle by hand, shift power divider to see that rear axle engages.
☐	☐	With brakes released and reservoir pressure not allowed to drop below 100 psi, adjust brakes to achieve clevis pin travel on application of 1" on all 4 drivers.
☐	☐	Check operation and locking of slacks, replace if necessary.
☐	☐	Inspect brake condition, compare lining thickness top to bottom to determine S-cam and bushing condition.
☐	☐	With good light, inspect brake shoe hardware, springs, rollers, shoe to drum contact and drum contact and condition.
☐	☐	Check rear end drain plugs for metal content and condition of gear lube. Top OFF or replace as needed.
☐	☐	On Eaton two speed axles, check all oil levels. Check 1/8" pipe plug at two speed motors, fill with 10 wt. oil.

Service Truck – Stocking Checklis

"Why are there two empty hydraulic oil jugs in here …and NO anti-freeze???"

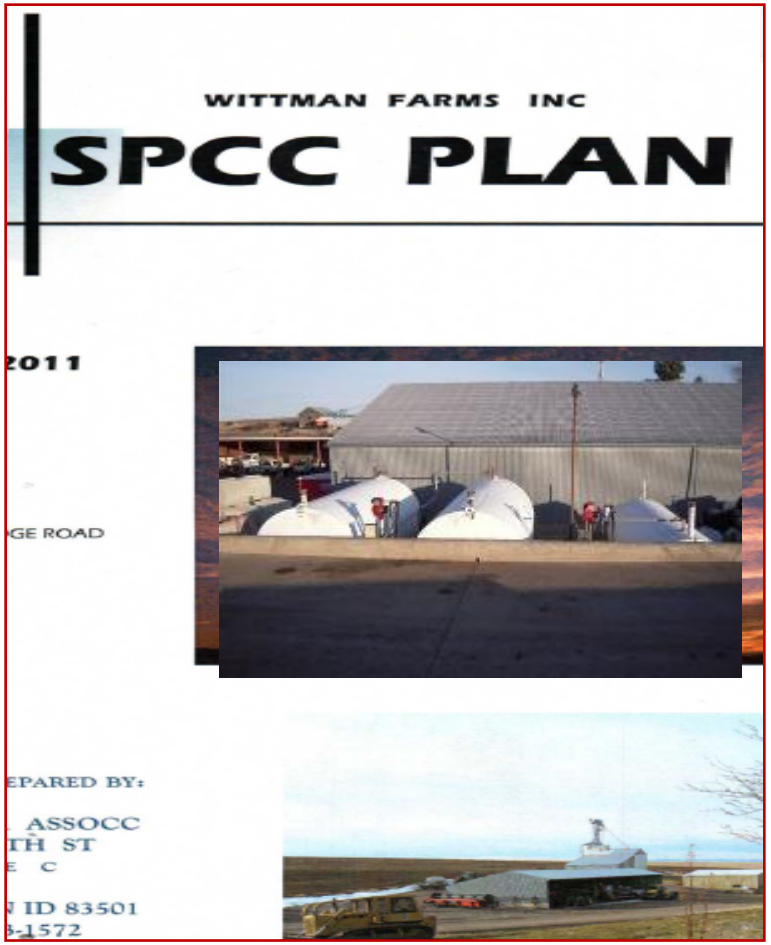
Freightliner Service Truck	Stocking Checklist
Left Side	Right Side
Fluids - Target Inventory 15w-40 engine oil 2 – 2 ½ Hytran Hydraulic Oil 2 – 2 ½ Tractor Hydraulic Oil 2 – 2 ½ 50/50 Antifreeze 2 – 2 ½	Jumper cables Extension Cord Small grinder Welding helmet Oxy/Acetylene Torch – ck gauges Bolt & Fastener Cabinet – ck inventory Heavy chain
Supplies Blue Towels, Rags Bungee Cords Anti-seize Window cleaner	**Rear Center Compartment** Shovel Heavy bar Blocks Welder/Generator – ck gas level Fuel Tank – ck fuel level Grease gun filler
Tool Compartment End wrenches, screw drivers, hammers Socket sets – 3/8, ½ & Impact Gun	**Top Left – Rear Storage Box** Welding Cables Hi-Lift Jack **Left Rear Side Compartment** Air chucks – blow nozzle, tire chuck & gauge

Fuel & Supply (chem/fert) Storage

- Handling procedures
- Security
- Spill prevention
- Identification/open container policies
- Fueling protocols

Spill Prevention Containment & Countermeasure Plan

- Facility owner, operators & key contacts
- Facility Description
  - Operations
  - Storage – detailed maps of tanks, location, and storage capacity
  - Drainage Pathway & Distance to navigable water
- Spill History
- Potential spill predictions, volumes, rates and controls
- Prevention measures provided
- Record keeping/meetings, inspections



$15,000 price tag… but required to source fuel!

Safety Procedures

- Exposures – too many to list
  - PTO, conveyors, hoists
  - Grain bin deaths
  - “riders”–truck, combine, tractor
  - Equipment rollovers – dozers, skidders, tractors
  - Transport – cargo strapping
  - Runaways-vehicles, implements
  - Story: Partner’s wife & kids driving potato truck
- What is your “safety policy”?

Think Proactively

…*what's this?* →

Lee Gilbert, ID St Insurance Division

- Conducts safety audits, on-site training
  - 4-5 hour Safety Training Sessions
  - Supervisor Workshops on Accident Investigations
  - Shop Audits – inspects for potential hazards
- *"…supervisor needs to communicate on near misses/close calls"*
- For every $ in insurance claim, employer spends $4-5
- Incentives for thinking proactively
  - safe work place
  - Insurance premium modifications

Interesting stats…

"Predictable Surprises…" – Mike Mullane, NASA Astronaut, author of Riding Rockets

- Success = doing things well over & over consistently
- Recipe for success = managing "processes"
  - Be aware of "normalization of deviance" – human tendency to deviate from standards
  - Take responsibility for adherence to standards
  - Be courageous leader in alerting to deviations
  - Beware of "false feedback" – absence of something bad happening … (it didn't cause wreck last time!)
  - Listen to people closest to the scene or front line
  - Archive, review and learn from "near misses" and disasters

Grain Bin SOPs

- SOPs for storing at proper moisture
- Rules for entry & monitoring
  - Harness, extraction equipment
  - Buddy systems
- Rules for riding in grain boxes and grain transport implements

Grain Entrapment Deaths

- 2009 - 41
- 2010 – 59
- 2011 – 33
- 2012 – 21
- 2013 – 33
- 2014 – 38
- 2015 – 24
- 2016 – 29
- 2017 – 23

Source: Purdue University

What is your Cell phone policy?

- Rules on texting or calling while on job
- Technology free zones
- Setting time and place for use
- Consequences for violating policy

→ What's driving increases in auto insurance

Are you asking for predictable surprise?

Job Site Safety SOPs – *Think like Seattle, WA contractor*

- Pocket size “little red book” with rules
- No access to jobsite until go thru training & sign-off
- Once on site, hard hat with “sticker” required
- Zero tolerance for violations of rules
- Lesson to farmers: is your farm a playground or work site?
- Challenge: how maintain our “culture” AND be safe?

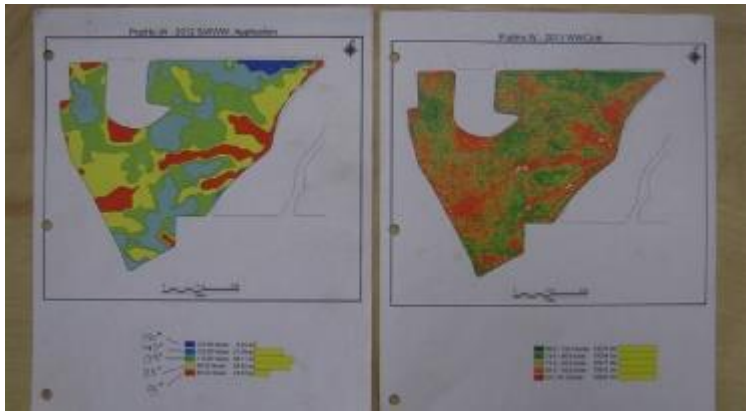
Resources – Safety SOPs

- iAuditor – build checklists, conduct inspections, file reports
  - http://sfty.io/q4Af/LOcHr6VzQx
- Farm Safety Hazard Checklist
  - http://fyi.uwex.edu/agsafety/employer-resources/farm-hazard-inspection-checklists/
- Great Plains Center for Ag Health
  - 10 health centers focused on farm safety/health
  - www.cdc.gov/niosh/oep/agctrhom.html

Agronomic Areas for Applying Process Improvement

- Nutrient management
- Integrated pest management (IPM)
- Access to conservation revenue incentive programs (CSP, EQIP)
- Input documentation – seed, fertilizer, chemical, field operations
- Precision Farming – Variable Rate Application SOPs

Mapping & Documenting VRA Process



Pre-harvest yield monitor calibration → in-field validation → download data to field record software → create raw yield maps → clean up yield data → build variability zones →

Review zone maps with agronomy manager for nutrient level recommendations → integrate soil tests with zone variance & assign rates by zone → enter revised rates & create VRA application files (.arm) → download .arm files to drill control computer

→ ***go home and have a beer!***

Herd Health/Stock Handling

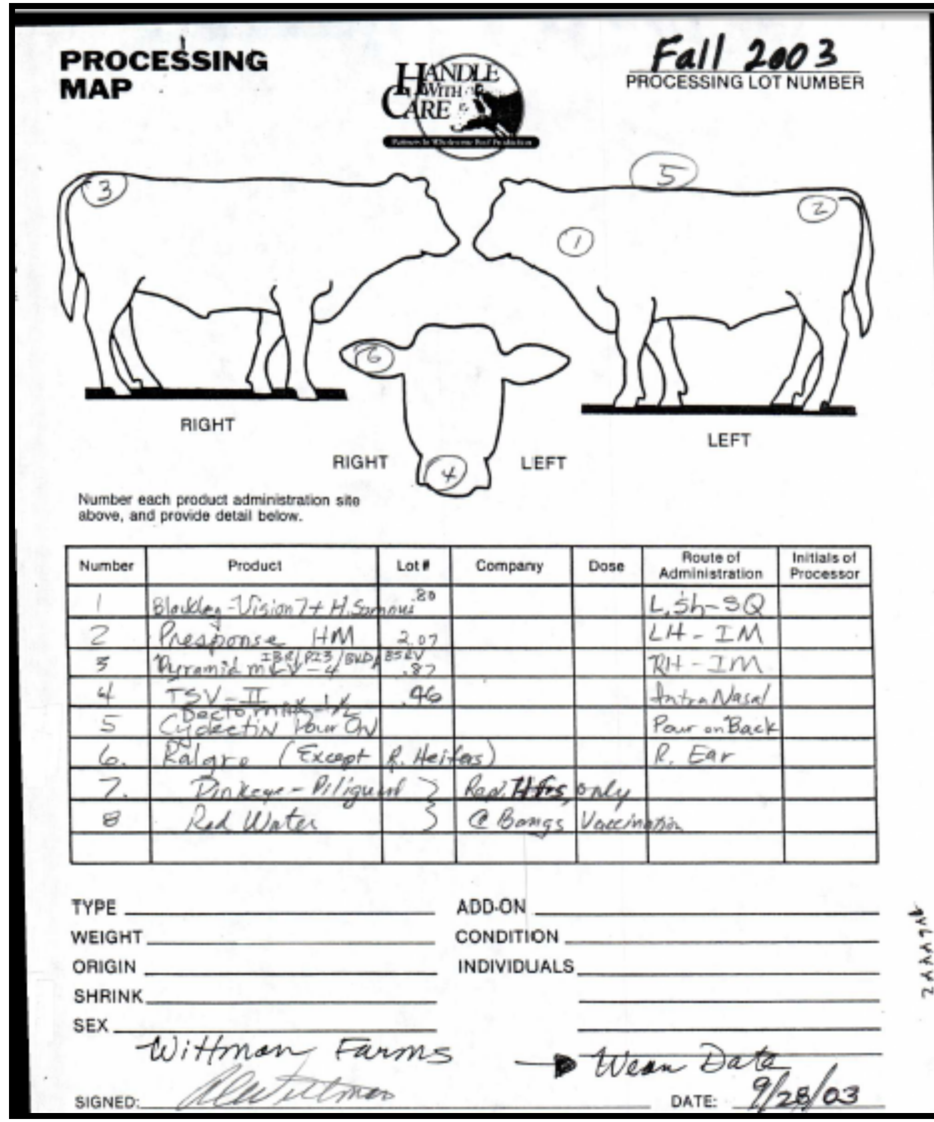
- Areas of application
  - Stock handling
  - Animal identification/traceback
  - Herd Health (BQA – Beef Quality Assurance)
  - Confined Animal Feeding Operations (CAFO)
  - Waste Management
- Resources

Wittman Farms
Beef Herd Health Protocol
Revised 11/30/11

Date	Action	Purpose/Detail	Products
	Cows		
January	Ck Identification tags – Pre Calving	All ear tags should match shoulder brands	
April	Pre-Breeding Visual	Ck eyes, teeth, feet, legs, udders	
	Bulls		
Late January	Breeding Soundness Examination	Check eyes, teeth, feet and legs, semen test	
	Leptospirosis	Prevent abortions	StayBred VL5
	Redwater/Blackleg	Prevents spore-forming bacteria	Vision 8+Somnus
	Pinkeye	Prevent eye redness & inflammation	Piliguard
	Vibriosis and/or Trichomoniasis	Prevent infertility & abortions	Vibrin
	IBR, BVD, PI3, BRSV virus vaccines	Prevent shipping fever	CattleMaster Gold
	External parasite control	lice and grub control in fall, fly control in summer	Cydectin (summer) Dectomax (fall)
January - April	**Calving (calves @ birth)**		
	Identify	Ear tag should match mother's	
	Disinfect navel	Prevent naval disease/ill	H20 & Bedadine solution
	Castrate (band) bull calves		Bands
	Vitamin A & D injection		Vedco A&D

Processing Map
Cattle Treatments

- Keeps crew organized at chute
- Permanent record of treatment
- Verification for feedlot to avoid duplicate input
- Verification to market outlet



PROCESSING MAP

HANDLE WITH CARE

Fall 2003
PROCESSING LOT NUMBER

RIGHT

RIGHT LEFT

LEFT

Number each product administration site above, and provide detail below.

Number	Product	Lot #	Company	Dose	Route of Administration	Initials of Processor
1	Blackleg-Vision 7 + H.Somnus	.80			L.Sh-SQ	
2	Presponse HM	2.07			LH-IM	
3	Pyramid MLV-4 IBR/PI3/BVD/BRSV	.87			RH-IM	
4	TSV-II	.46			IntraNasal	
5	Cydectin Pour On				Pour on Back	
6.	Ralgro (Except	R. Heifers)			R. Ear	
7.	Pinkeye - Piliguard	}	Repl. Hfrs only			
8	Red Water	}	@ Bangs	Vaccination		

TYPE ______ ADD-ON ______

WEIGHT ______ CONDITION ______

ORIGIN ______ INDIVIDUALS ______

SHRINK ______

SEX ______

Wittman Farms → Wean Data

SIGNED: [signature] DATE: 9/28/03

Stock Handling

- **Quiz:** Name recent incidents that gave meat industry black eye?

  →**Answers**: downer cows; chicken cages; …
- What is your "animal treatment" culture?
- Do you have an animal care policy & SOPs?
- Are food safety protocols "up to snuff"?

Livestock Resources

- Beef Quality Assurance - http://www.bqa.org/
  - Beef, dairy training manuals and resources
  - Transportation, animal care/handling, use of antibiotic use, etc.
- Dairy –
  - National Dairy BQA Manual
    →*www.**bqa**.org/CMDocs/**bqa/DairyBQAManual**.pdf*
  - DairyWorks, Tom Fuhrman
- AgTexas FCS – Allan Watson, COO
  - process improvement programs
  - Client incentive program-1/3 of 1st year savings
- Animal Care - FARM Evaluation guide
  - Temple Grandin – CSU – stock handling systems

Food Safety, GAPs, BMPs

- Dual drivers pushing growers for implementation
  - Defensive (food safety, water quality, etc.)
  - Offensive (market access, premiums)
- Process for putting GAPs in place
- Resources available to minimize cost and avoid “re-inventing” wheel

Analyzing Variances & Impacts
Statistical Process Control/Influence Diagrams

- Causes
  - Normal deviations (“noise”)
  - Out-of-bounds: procedural or system process weakness
- Impacts
  - Cost over-runs
  - Crop damage
  - Product quality damage

Variance Case Study - Sprayer

- Goal: Spray @ specific target/acre
- Problem – Chemical being over-applied based on acreage
- Consequences: 10% cost over-run; crop damage; envir. issues
- Analysis/Potential Causes of Problem
  - Overlap?
  - Nozzle wear?
  - Flow meter calibration?

Quiz: (1) What is biggest factor leading to Precision Ag?

(2) What SOPs could be implemented to avoid this problem?

Human Resource SOPs

- Job announcement, application, interview
- Job descriptions, training & orientation
- Safety Guidelines
- Performance Reviews
- Compensation Policy and Payroll Procedures
- Employee benefits, vacation, sick leave

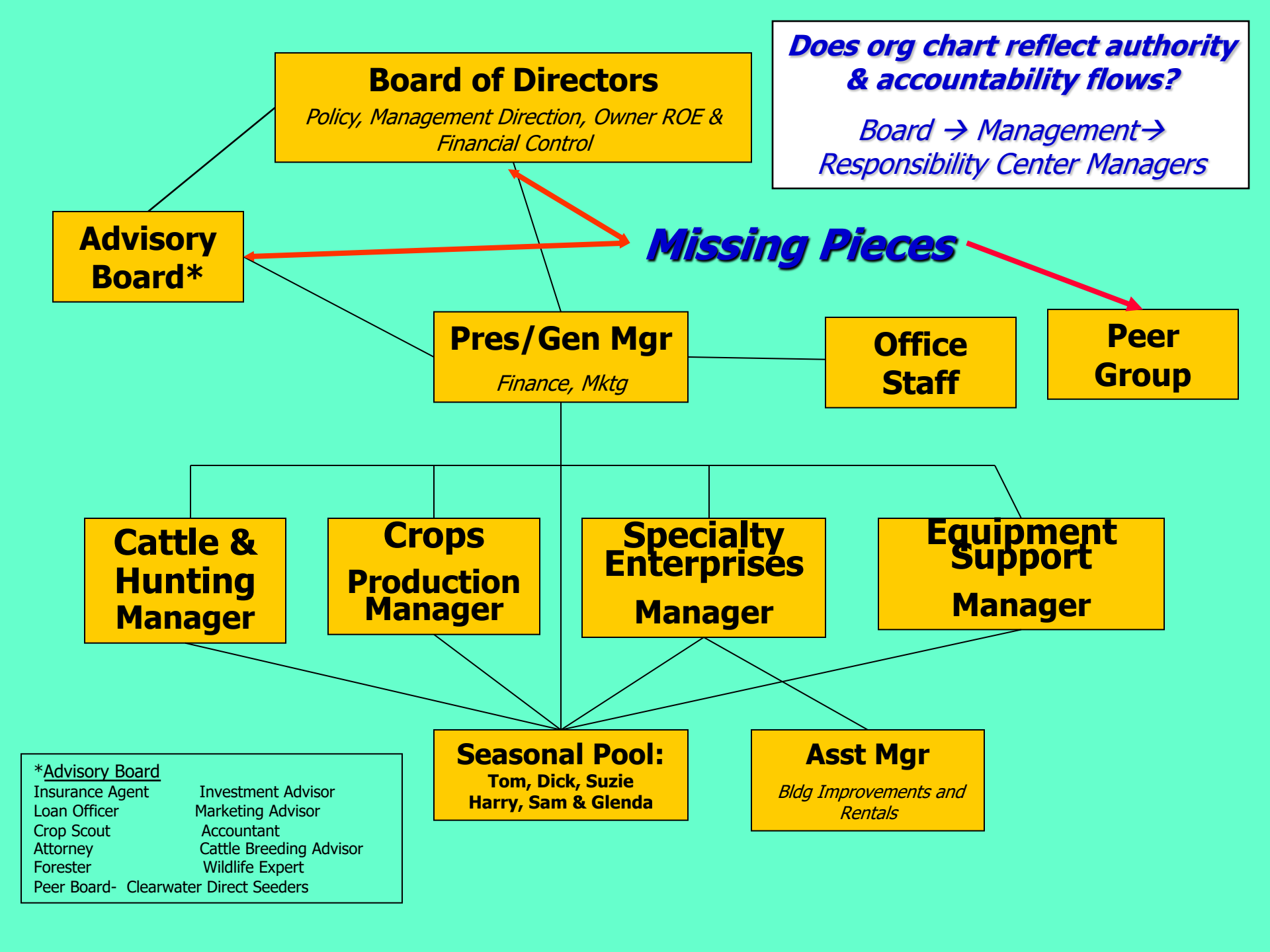
→ Are these addressed in Employee Handbook/ Management System & Governance Manual?

Are Policies Written Down?

36% do this!

…Common "Land Mines"

- Housing
- Company vehicles
- Room and board
- Expense accounts
- Setting compensation
- Withdrawals of capital
- Insider/inter-entity transactions
- Family Employment Policy
- Medical benefits
- Retirement plans/pensions
- Business benefit continuation
- Workdays and holidays
- Vacations, sick, business leave
- Buyout Understandings
- Outside activities


Does org chart reflect authority & accountability flows?
Board → Management → Responsibility Center Managers
Board of Directors
Policy, Management Direction, Owner ROE & Financial Control
Advisory Board*
Missing Pieces
Pres/Gen Mgr
Finance, Mktg
Office Staff
Peer Group
Cattle & Hunting Manager
Crops Production Manager
Specialty Enterprises Manager
Equipment Support Manager
Seasonal Pool:
Tom, Dick, Suzie
Harry, Sam & Glenda
Asst Mgr
Bldg Improvements and Rentals
*Advisory Board
Insurance Agent
Investment Advisor
Loan Officer
Marketing Advisor
Crop Scout
Accountant
Attorney
Cattle Breeding Advisor
Forester
Wildlife Expert
Peer Board- Clearwater Direct Seeders

What incentives are you using?

"…avoiding concrete"

- Rewards for clean inspections
- Share in premiums gained over market
- Gift/bonus for attending safety meeting
- Bonuses for days without accidents
- Recognition for developing more efficient or safe process
- Other incentives?
  - –
  - –
  - –

Where to Start - Implementation Strategy

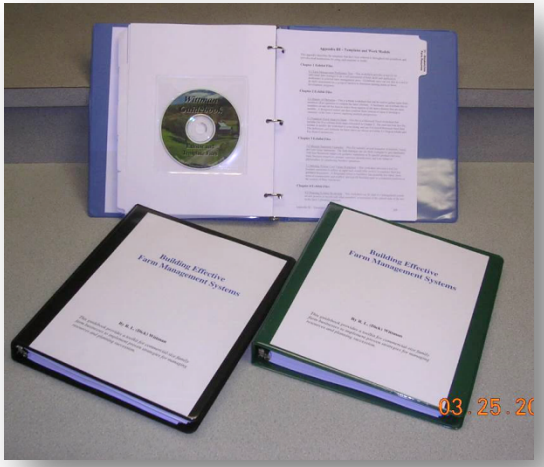
- Form in-house team or appoint ***Process Improvement Coordinator***
- Review legislation, regulatory requirements; attend training conferences – food & worker safety
- Research peers who have implemented GAPs, SOPs, BMPs…define scope you need to codify
- Research audit/certifying organizations
- Consider engaging auditor/certifier to do “test drive”
- Develop strategy for getting documentation in place
  - Do your own? Or outsource?
- Put SOPs where staff can FIND and USE them!

Summary – "*Good is the enemy of great!*"

- Ag business → LOTS of MOVING PARTS
- Must excel at **process mapping** and **costing**
- Promote culture of **100% buy-in** for SOP implementation
  - Will you be "proactive" or "reactive"?
  - Assign "lead role" to accountable party – ***Process Improvement Coordinator***
  - "Checking the box" not the same as "living it!"
  - Audit for compliance, punish and reward strategically

Resources

- Guidebook aids clients in working through implementation process
- DVD allows participants to "take story home"



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