



The Food and Environment  
Research Agency

*How to operate a pesticide residues  
laboratory efficiently*

LAPRW Santa Fe, 7 –11 June 2009

Stewart Reynolds

?



**Why is he  
a winner ?**

**Is he the  
best  
athlete?**



Is it  
the  
bike?



## *Competitive edge*

- bike weight/strength
- aerodynamic design
- position on the bike
- texture of suit
- shape of helmet

A number of small savings can produce a significant overall effect



## *What changes have we seen in the past 10 years?*

- Results generally more reliable
- Surveys now reported much quicker
- Numbers of pesticides sought x10
- Surveys of more difficult matrices undertaken
- Reporting limits 5 –10 x lower (0.01 mg/kg)

## *Driving forces behind the changes*

- Regulators
- Consumers
- Retailers
- Advances in technology
- Residue analysts

## *What is expected of laboratories by customers?*

- Low price
- Reliable results
- Quicker turnaround
- Wider scope
- Lower reporting limits
- Added value
- Sustainability

Value for money – Improve efficiency

## *Operating like a business unit*

Things that you should be doing:

- Resource planning & management
- Monitoring performance (delivery & efficiency)
- Improving delivery & efficiency
- Improving housekeeping
- Improving sustainability

## *Challenges to cope with*

- Variable workload
- Staff absences
- Instrument failure(s)

## *Resource planning*

- Need to utilise both staff (and instrument resources) efficiently
- Require an annual resource plan

# Resource Plan



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Project Manager	Joe Bloggs
Cost centre	OPGB
Customer	Various

Daily rate	
Band 7	940
Band 6	725
Band 5	554
Band 4	423
Band 3	321
Band 2	237
Band 1	203

## Staff Resource Allocation Days

## Projects

Year	2009	Staff	Nat Mon	Enforce	School	Comm 1	Comm 2	S Comm	X-Team
Band 7	10	Joe Bloggs	5	1	1	2	1	0	0
Band 6	20	Jeff Green	10	0	2	4	2	1	1
Band 5	100	Henry Smith	90	5	5	0	0	0	0
Band 4	140	LC-MS	45	5	13	25	20	30	2
Band 3	181	Ann Back	120	0	20	30	11	0	0
Band 3	181	Peter Wood	10	10	0	0	11	140	10
Band 3	181	LC-MS	100	6	25	50	0	0	0
Band 3	181	LC-MS	100	10	10	10	6	40	5
Band 2	181	James Childs	140	0	0	20	21	0	0
Band 2	181	Barry Wilson	140	10	0	20	0	0	11
Band 2	181	Jim Biggs	50	0	20	0	0	100	11
Band 2	181	Mary Howell	65	10	10	30	15	40	11
Band 2	181	June Summer	21	0	50	60	0	30	20
Band 1	181	Jack Sprat	70	10	15	30	15	25	6

## Staff Costs

Year	2009	Staff	Nat Mon	Enforce	School	Comm 1	Comm 2	S Comm	X-Team
Band 7	9400	Jo Bloggs	4700	940	940	1880	940	0	0
Band 6	14500	Jeff Green	7250	0	1450	2900	1450	725	725
Band 5	55400	Henry Smith	49860	2770	2770	0	0	0	0
Band 4	59220	LCMS	19035	2115	5499	10575	8460	12690	846
Band 3	58101	Ann Back	38520	0	6420	9630	3531	0	0
Band 3	58101	Peter Wood	3210	3210	0	0	3531	44940	3210
Band 3	58101	LCMS	32100	1926	8025	16050	0	0	0
Band 3	58101	LCMS	32100	3210	3210	3210	1926	12840	1605
Band 2	46341	James Childs	33180	0	0	6420	6741	0	0
Band 2	42897	Barry Wilson	33180	2370	0	4740	0	0	2607
Band 2	42897	Jim Biggs	11850	0	4740	0	0	23700	2607
Band 2	42897	Mary Howell	15405	2370	2370	7110	3555	9480	2607
Band 2	42897	June Summer	4977	0	11850	14220	0	7110	4740
Band 1	34713	Jack Sprat	14210	2030	3045	6090	3045	5075	1218
<b>Total</b>	<b>623,566</b>		<b>299,577</b>	<b>18,911</b>	<b>50,319</b>	<b>82,825</b>	<b>33,179</b>	<b>116,560</b>	<b>20,165</b>

## Non-Pay Running Costs

Consumables		35,000	2,000	65,000	10,000	4,500	15,000	3,000
Subcontractors		0	0	0	0	0	0	0
T&S		0	0	0	0	0	0	0
<b>Total</b>	<b>756,036</b>	<b>334,577</b>	<b>20,911</b>	<b>115,319</b>	<b>92,825</b>	<b>37,679</b>	<b>131,560</b>	<b>23,165</b>

## *Project monitoring*

- Hold monthly meetings between team leader and project managers
- Project leader reports on percent delivery, milestones and staff utilisation

## *Timeliness of delivery*

- Monitor and keep a record of delivery to customers
- Need to keep a record of reasons for late delivery

# Weekly staff time recording

Name J. Bloggs Sun 3 May 2009

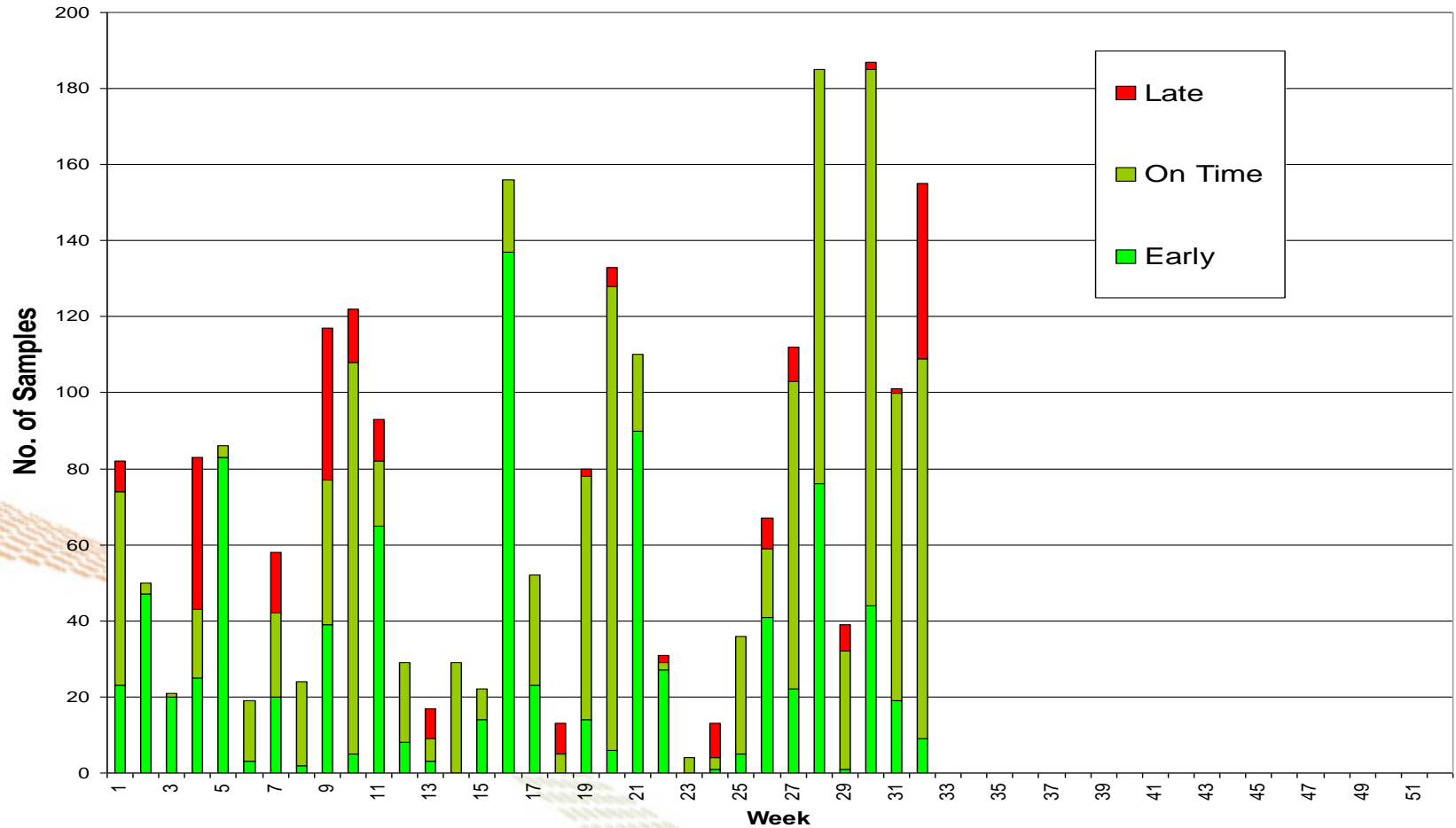
		Mon	Tues	Wed	Thu	Fri	Sat	Sun	
Project	Activity	27	28	29	30	1	2	3	Total
T 463	Monitoring	5.0	3.0		6.0				
T 478	Enforcement			6.0	0.5				
T 910	Commercial 1	1.0			1.5				
T 933	Commercial 2		4.0						
O 910	Management	1.5	1.0	1.0	3.0				
O 920	Accreditation	1.0							
O 930	Conference					7.5			
	<b>Totals</b>	<b>8.5</b>	<b>8.0</b>	<b>7.0</b>	<b>11.0</b>	<b>7.5</b>			<b>42.0</b>

# Weekly delivery table

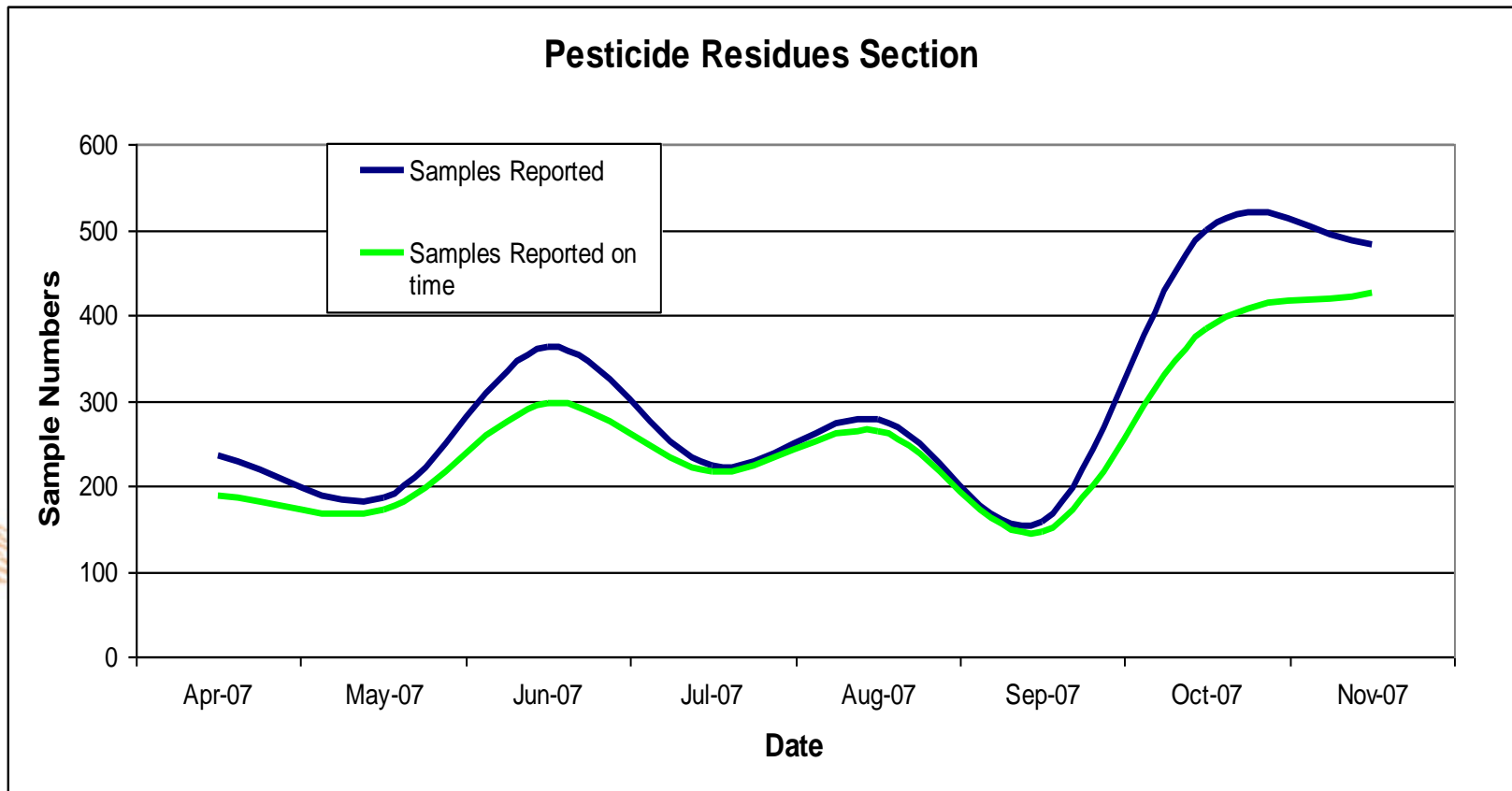
Date	Week	% On Time & Early	Samples Reported	Early	On Time	Late	Notes
11-Jan	41	100%	15	3	12	0	
18-Jan	42	100%	42	10	32	0	
25-Jan	43	82%	22	0	18	4	Late delivery from LC-MS
1-Feb	44	91%	77	13	57	7	Autosampler failure
8-Feb	45	91%	58	1	52	5	Late delivery from LC-MS
15-Feb	46	97%	67	0	65	2	AQC failure repeat chlormequat analyses
22-Feb	47	100%	151	13	138	0	
1-Mar	48	100%	382	4	377	0	
8-Mar	49	92%	24	0	22	2	Repeat analyses required on difficult matrices
15-Mar	50	82%	39	1	31	7	AQC failure of GC-MS MRM batch
22-Mar	51	100%	13	0	13	0	
29-Mar	52	100%	28	5	23	0	
5-Apr	53	78%	23	5	13	5	Late delivery from LC-MS

# Weekly Delivery

## Turnaround - Pesticide Residues



# *Delivery versus workload*



## *Reasons for late delivery*

- Data processing/checking
- Instrument failures
- Staff shortages
- Difficult matrices
- AQC failures

## *Inefficiency - causes*

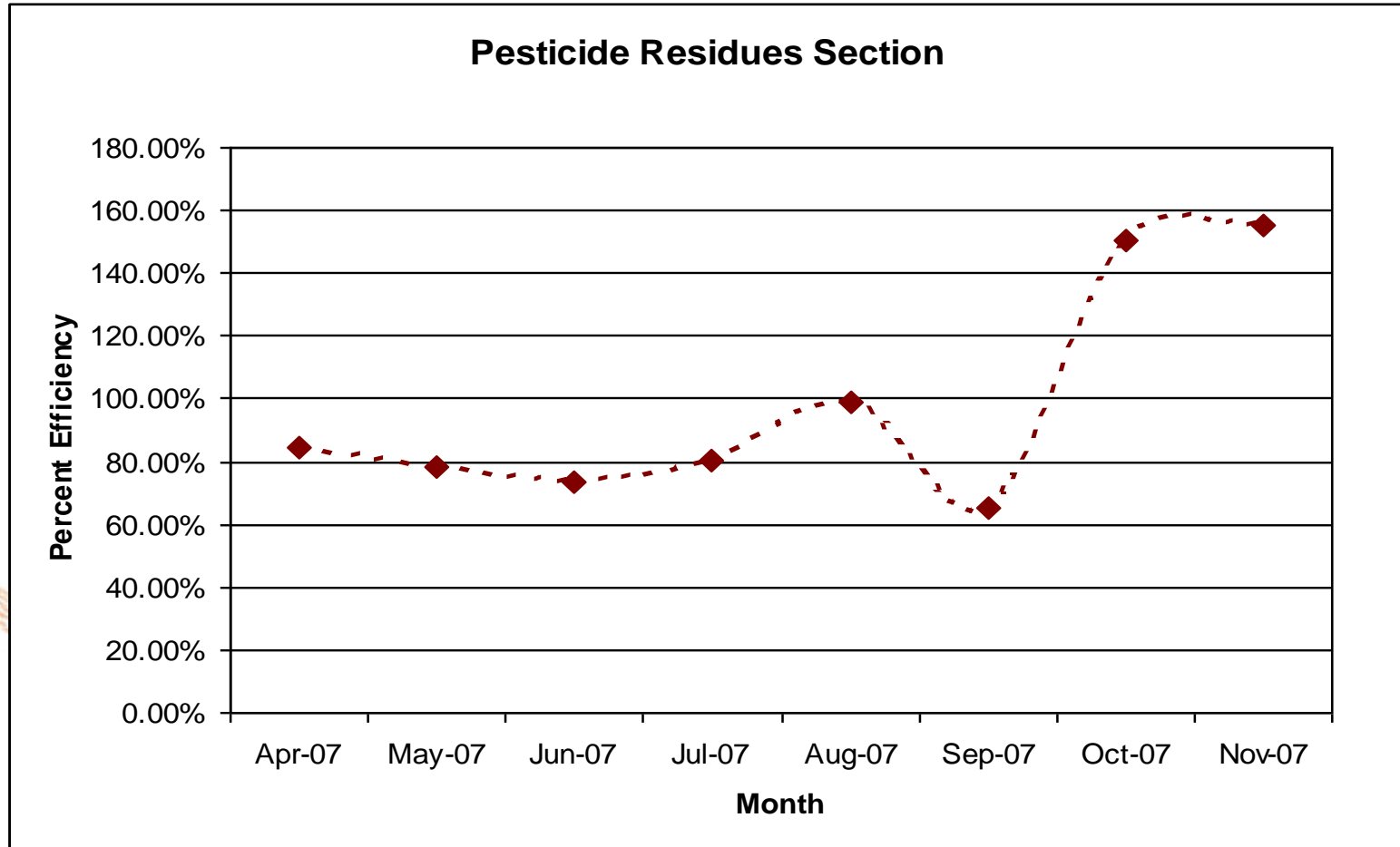
- Small batch sizes
- Non robust methods
- Poorly maintained instruments
- Untrained/inflexible staff
- Untidy laboratory

QC failures  Repeat analyses

## *Measure of efficiency*

- Relative effort (RE) = Estimated time required to analyse an average size batch of samples
- Earned hours = RE x number of batches analysed each week
- Recorded hours = Number of hours actually recorded by staff to do the work
- % Efficiency =  $\text{Earned hours} / \text{Recorded hours} \times 100$

# Efficiency



# Income/expenditure report



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Project Code	Customer		Income	Resource Plan Value	Consumables	Staff costs	Total	25 % month 3 of 12	Mile stones	Notes
S506	CRD	National Monitoring Programme	300.0	299.6	8.2	68.6	76.8	25.60	2 out of 3 met	Additional work allocated. Overtime agreed to help catch-
S505	CRD	Enforcement	20.0	18.9	0	0	0	0.00		No work yet allocated
S5GI	CRD	School Fruit	50.0	50.3	2.2	16.6	18.8	37.60	Q1 met	First 1/4 complete.High spend from LC-MS
S5GV	comm 1	Exotic fruit survey	85.0	82.8	4.7	15.5	20.2	23.80	On schedule	On-target
S5GV	comm 2	Potato experiment	33.0	33.2	0.5	2.2	2.7	18.20	Late delivery	Samples late in arriving More samples expected later in the year
R6MF	S comm	Mixed samples	120.0	116.6	4.4	6.1	10.5	8.75		
X5XB	XT	Cross team	20.0	20.2	1.3	10.6	11.9	59.50	On schedule	Work was underpriced

## *Quality Indicators*

- Customer satisfaction surveys
- Complaints/accolades database
- Results in proficiency testing

# *Improved housekeeping*

## *5-S discipline*

- **Step 1 - Sort** (Clearing)  
Sort out required from non required items  
Keep only those items you need - not 'just in case'.
- **Step 2 - Straighten** (Arrange)  
Everything should be placed in order  
Everything should be easy to find
- **Step 3 - Shine** (Clean)  
Eliminate rubbish and dirt in the office
- **Step 4 - Standardise**  
Maintain steps 1, 2 & 3  
Establish working practices to make it happen
- **Step 5 - Sustain** (Continuous Improvement)  
When the 5-S discipline is embedded in the workplace, practice and repeat until it becomes a way of life

## *Reasons for better housekeeping*

1. Reduce space occupied
2. Create better environment for staff to work in
3. Create a better impression to visitors
4. Improve efficiency of delivery

## *Clear out*

- All large capital items to be identified
- Removal of all paperwork from labs
- Removal of all consumables and chemicals that are not regularly in use
- Rationalise use of fridges & freezers
- Empty store rooms to hold paperwork and chemicals

**Throw away as much as possible**

## *Introduce culture change*

- Educate staff in principles and benefits of good housekeeping
- Introduce systems for ensuring good housekeeping is employed
- Disposal dates for samples, sample extracts
- Set objectives in management performance agreements
- Monitor

## *Commitment to Sustainability (What does it mean?)*

- Reduction in carbon emissions
- Waste reduction
- Decrease water usage
- Increase recycling and the use of recycled products
- Adaptation to climate change
- Promote training and up-skilling of staff

**Sustainable operations policy**  
(series of environmental management documents)

## *Paper use procedure*

- Use e-mail instead of paper
- Use the telephone
- Use print preview
- Print out documents double sided
- Use recycling bins for all paper
- Order only recycled paper

## *Conclusions*

- Improvements in performance are not just bought about by implementing modern methodology/technology
- Need to implement effective management systems that allow you to monitor performance

*The winner !*



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