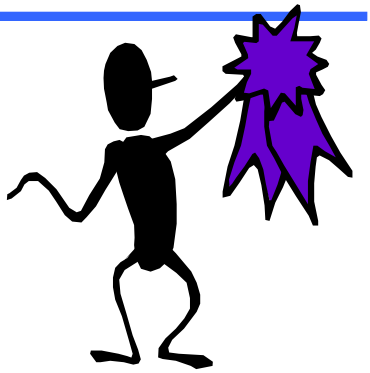
"Raw data in laboratories under quality management system and LIMS as a tool for data handling and traceability"



Imma Alsina
Quality Assurance Manager
Laboratori Agroalimentari – DARP

Ljubljana, April 19th 2006

RAW DATA

- **Raw data means any laboratory worksheets, records, memoranda, notes, or exact copies thereof, that are the result of original observations and activities of a nonclinical laboratory study and are necessary for the reconstruction and evaluation of the report of that study. In the event that exact transcripts of raw data have been prepared (e.g., tapes which have been transcribed verbatim, dated, and verified accurate by signature), the exact copy or exact transcript may be substituted for the original source as raw data. Raw data may include photographs, microfilm or microfiche copies, computer printouts, magnetic media, including dictated observations, and recorded data from automated instruments.**

FDA Good Laboratory Practice Regulations 58.3

RAW DATA

- **Raw data means all original test facility records and documentation, or verified copies thereof, which are the result of the original observations and activities in a study. Raw data also may include, for example, photographs, microfilm or microfiche copies, computer readable media, dictated observations, recorded data from automated instruments, or any other data storage medium that has been recognised as capable of providing secure storage of information for a time period as stated in section 10, below.**

OCDE Section I, 2.3.7.

RAW DATA

- **RAW DATA is directly related to the measures carried out in the laboratory, the notes and any type of observations that contribute <u>significantly</u> to the conclusions or the final analytic result.**

RAW DATA

- **GLP:**
  - **Immediate, direct, precise and readable registration**
  - **Dated and signed**
  - **Modification without hiding precedent data**
  - **Cause of the change**
  - **Computerized data with the same approach**
  - **...**

RECORDS

- **ISO17025:2005:**
- 4.12.1.1 The laboratory shall establish and maintain procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of **quality and technical records**. Quality records shall include reports from internal audits and management reviews as well as records of corrective and preventive actions.
- 4.12.1.2 All records shall be legible and shall be stored and retained in such a way that they are **readily retrievable** in facilities that provide a suitable environment to prevent damage or deterioration and to prevent loss. **Retention times** of records shall be established.

RECORDS

- **ISO17025:2005:**
- 4.12.1.3 All records shall be held **secure** and in **confidence**.
- 4.12.1.4 The laboratory shall have procedures to protect and back-up records stored electronically and to prevent unauthorized access to or amendment of these records.

- NOTE Records may be in **any media**, such as hard copy or electronic media.

RECORDS

- **ISO17025:2005:**
- 4.12.2 Technical records
- 4.12.2.1 The laboratory shall retain records of original observations, derived data and **sufficient information** to establish an audit trail, **calibration records, staff records and a copy of each test report** or calibration certificate issued, for a defined period. The records for each test or calibration shall contain sufficient information to facilitate, if possible, identification of factors affecting the uncertainty and to enable the test or calibration to be repeated under conditions as close as possible to the original. The records shall include the **identity of personnel** responsible for the sampling, performance of each test and/or calibration and checking of results.

RECORDS

- **ISO17025:2005:**
- NOTE 1 in certain fields it may be impossible or **impractical to retain records of all original** observations.
- NOTE 2 Technical records are accumulations of data (see 5.4.7) and information which result from carrying out tests and/or calibrations and which indicate whether specified quality or process parameters are achieved. They may include forms, contracts, work sheets, work books, check sheets, work notes, control graphs, external and internal test reports and calibration certificates, clients' notes, papers and feedback.

DIFFERENT KIND OF RECORDS

RECORDS

- **ISO17025:2005:**
- 4.12.2.2 Observations, data and calculations shall be **recorded at the time** they are made and shall be **identifiable to the specific task**.
- 4.12.2.3 When mistakes occur ¡n records, each mistake shall be crossed out, not erased, made illegible or deleted, and the correct value entered along side. All such alterations to records shall be signed or initialled by the person making the correction. In the case of records stored electronically, equivalent measures shall be taken to avoid loss or change of original data.

MODIFICATION OF RECORDS

RECORDS

- **ISO17020:1998:**
- 12.1 The inspection body shall maintain a **record system to suit its particular circumstances** and to comply with applicable regulations.
- 12.2 The records shall include **sufficient information** to permit satisfactory evaluation of the inspection.
- 12.3 All records shall be safely **stored for a specified period**, held secure and in confidence to the client, unless otherwise required by law.

INSPECTION SERVICE

RAW DATA

- Besides the primary data, one should record in the notebook or on the "record sheet" **all the observations that are believed of to be of interest**, as well as problems that arise and an explanation of whether they have been solved.
- The data should be **written directly** in the notebook or "record sheet" as it is acquired, to avoid possible transcription errors. You should not record first on a piece of paper and, later, to transcribe it to the notebook.
- All the data should be **written in pen**. You must not use a pencil or any other type of erasable ink.

RAW DATA

- **Erasable ink** or correction liquids must not be used.
- The errors should be corrected in a way that can still be read, and the value or the correct text written in the margin. The **justification of the error** should be dated an written in the margin or at the foot of the page and it can be as simple as: "not well written", “calculation error" or “transcription error".
- **Blank pages** or substantial portions of pages without text have to be marked with a cross to ensure that they won't be used to write back dated (*posteriori).*

RAW DATA

- It is necessary to write with clear and readable letters.
- It’s advisable to write using the verb in first person and in the present tense (writing down what is happening at the same moment).
- When a notebook of registration of primary data or “record sheet” of data is completed, it will be filed appropriately

NOTEBOOKS **FORMS**

RECORDS

GENERATED ELECTRONICALLY

LIMS

TRANSMISSION

How improve data handling and traceability?

LIMS

Laboratory Information Management System

TRACEABILITY

- When the sample arrived
- Who received it, who accepted it and under what kind of contract conditions
- Where the sample was conserved initially
- How the sample was distributed
- Where the sample was conserved until the moment of the analysis
- If someone split the sample or sampling procedure
- What analytic procedure was followed (with detail, for example, of the conditions of use of equipment)
- Quality parameters of the analytic method used
- Technicians that carried out the analyses (training and qualifications)

Answers in LIMS

TRACEABILITY

- What reagents were used (with detail, for example, of reception date and of opening date)
- What standards / strains were used (with the supplier's certificate or all the relative information in its preparation was)
- What equipment was used (maintenance, calibration and verification)
- Who and how the specifications of the equipments, reagents, cultivation means and materials used were checked to their reception
- What mechanisms for the evaluation of the quality of the results were used
- What were the environmental conditions
- Who validated the results
- When the analysis report was published

Answers in LIMS

Characteristics of the LIMS of the Laboratori Agroalimentari - DARP

- User records: 58 with 11 types of different menus
- Determinations records: 2960
- Clients records: 427
- Cards of equipment: 1193
- Cards of chemicals: 479
- Backup space: 1.2 GB

	2003	2004	2005
Number of samples	13.670	18.367	14.999
Number of determinations	121.614	115.028	110.619

Necessary functions in a LIMS

- Management of service loads
- Traceability of data
- Management of plans/programs

Security

Flexibility

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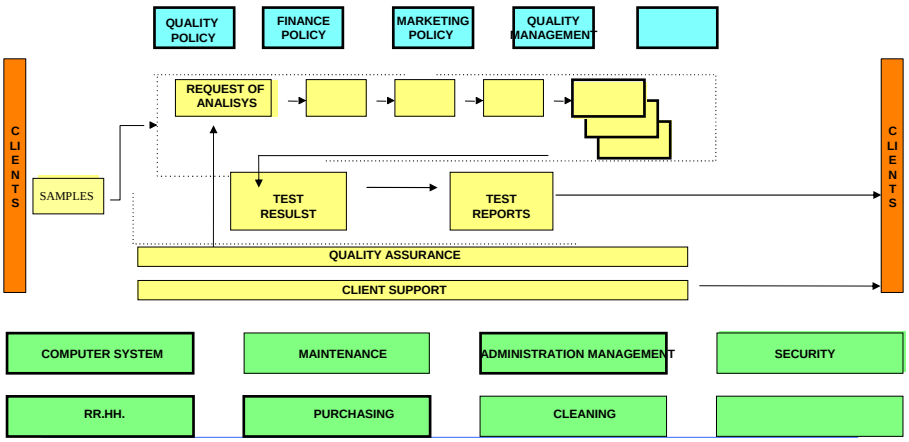
LIMS options versus ISO17025

LIMS Options	ISO17025 Requirements
Management of samples ▪ Management of Samples ▪ Information of the client and samples ▪ Chain of safekeeping ▪ Service loads ▪ Bar code ▪ Allocation of analytical procedure	Control of data and Handling of test and calibration items ▪ Traceability ▪ Records about handling, storage and conservation of test items. ▪ A system for identifying test and/or calibration Items
Menu of analysis and results reports ▪ Crossing of results from Excel ▪ Validation of results ▪ Test report with the required information. ▪ Additional reports	Test reports ▪ Required information : title, data of client, data of sample and univocal identification, used method, dates of reception and analysis. ▪ Changes of test reports
Users profiles ▪ Different menus with different access levels. ▪ Administrator of the system.	Control of data ▪ Integrity of the data ▪ Verification of data

LIMS options versus ISO17025

LIMS Options	ISO17025 Requirements
Management of equipment ▪ Card of equipment ▪ Plan of calibration and maintenance ▪ History of repairs ▪ Control of manufacturer instructions	Equipment ▪ Records of the item of equipment (Identification, manufacturer, location, instructions) ▪ Dates, results and calibration and maintenance plans. Any damage and repairs.
Management of chemicals ▪ Card of chemical ▪ Request of chemicals and stock control ▪ Control of expiry of chemical	Chemicals ▪ Traceability ▪ Control of expiry
Management of personnel ▪ CV ▪ Training programs ▪ Organization	Personnel ▪ Personnel list and jobs descriptions ▪ Professional qualifications ▪ Training programs

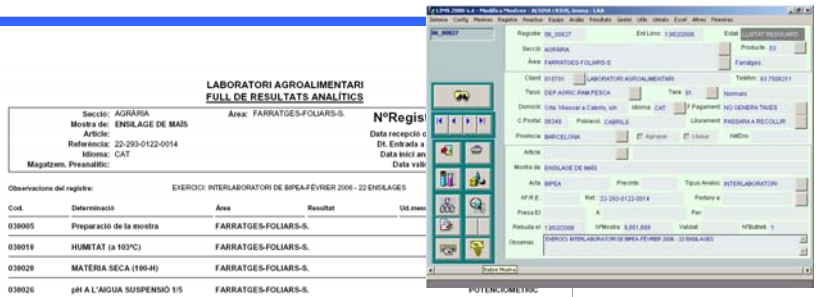
From samples acceptance to test record



Planning

- Service loads:
  - Allocation of samples by type of product

Allocation of samples by type of product



LABORATORI AGROALIMENTARI
FULL DE RESULTATS ANALÍTICS

Secció: AGRÀRIA
Àrea: FARRATGES-FOLIARS-S.
Mostra de: ENSILAGE DE MAIS
Article:
Referència: 22-293-0122-0014
Idioma: CAT
Magatzem. Preanalític:

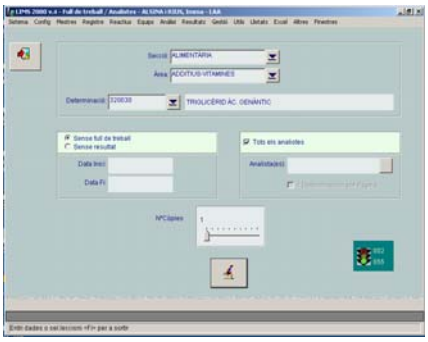
Observacions del registre: EXERCICI: INTERLABORATORI DE BIPEA-FEVRIER 2006 - 22 ENSILAGES

Cod.	Determinació	Àrea	Resultat	Ud.mes	
030005	Preparació de la mostra	FARRATGES-FOLIARS-S.			
030010	HUMITAT (a 103ºC)	FARRATGES-FOLIARS-S.			
030020	MATÈRIA SECA (100-H)	FARRATGES-FOLIARS-S.			
030026	pH A L'AIGUA SUSPENSIÓ 1/5	FARRATGES-FOLIARS-S.			POTENCIOMÈTRIC
030027	CENDRES	FARRATGES-FOLIARS-S.			GRAVIMETRIA o NIR
030030	CALCI	FARRATGES-FOLIARS-S.			ABSORCIO ATOMICA / ICP o
030040	FÒSFOR	FARRATGES-FOLIARS-S.			COLORIMETRIA VISUAL o N
030050	MAGNESI	FARRATGES-FOLIARS-S.			ABSORCIO ATOMICA / ICP o
030070	MIDÓ	FARRATGES-FOLIARS-S.			POLARIMÈTRIC
030051	EXTRACTE ETERI	FARRATGES-FOLIARS-S.			GRAVIMÈTRIC o NIR
030052	PROTEÏNA BRUTA (N*6.25)	FARRATGES-FOLIARS-S.			VOLUMÈTRIC o NIR
030054	NITROGEN AMONIACAL	FARRATGES-FOLIARS-S.			VOLUMÈTRIC
030061	PROTEÏNA DIGESTIBLE	FARRATGES-FOLIARS-S.			CÀLCUL ARITMÈTIC

Planning

- Service loads:
  - Allocation of samples by type of product
  - Allocation of samples by analyst and method.

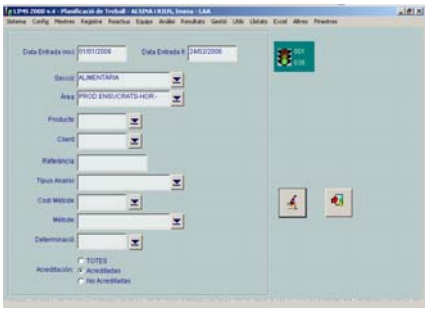
Allocation of samples by analyst and method



Planning

- Service loads:
  - Allocation of samples by type of product
  - Allocation of samples by analyst and method.
  - Allocation of samples by other criteria.

Allocation of samples by other criteria

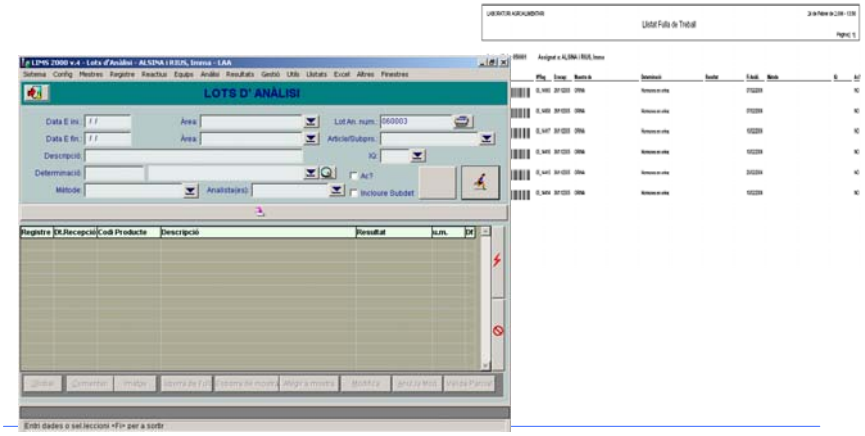


Planning

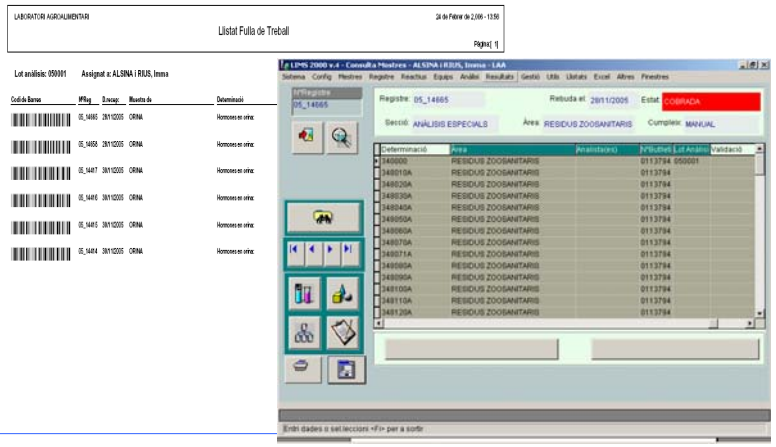
- Service loads:
  - Allocation of samples by type of product
  - Allocation of samples by analyst and method.
  - Allocation of samples by other criteria.
  - Elaboration of lots or series of work by technique or determination.

Traceability

Elaboration of lots or series of work by technique or determination

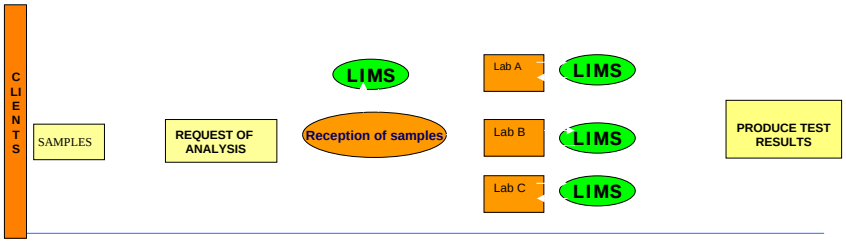


Elaboration of lots or series of work by technique or determination

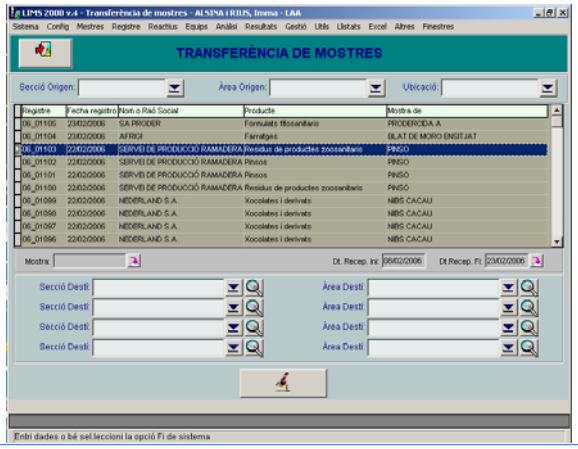


Chain of safekeeping

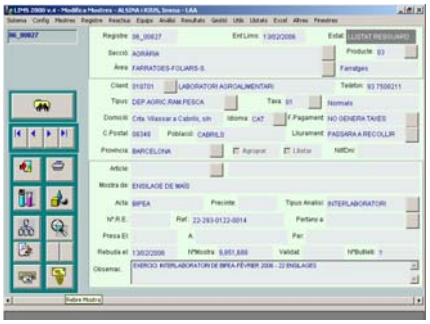
- Each change of proprietor of the sample or subsamples is registered in the LIMS.

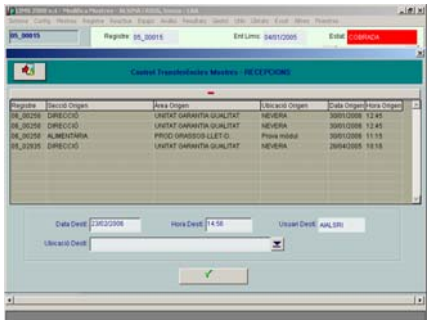


Chain of safekeeping

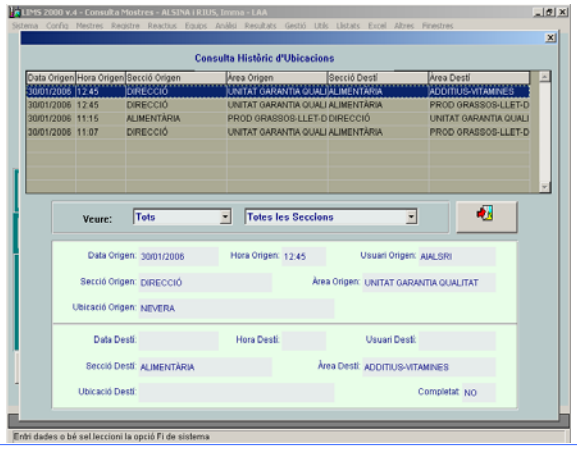


Chain of safekeeping





Chain of safekeeping



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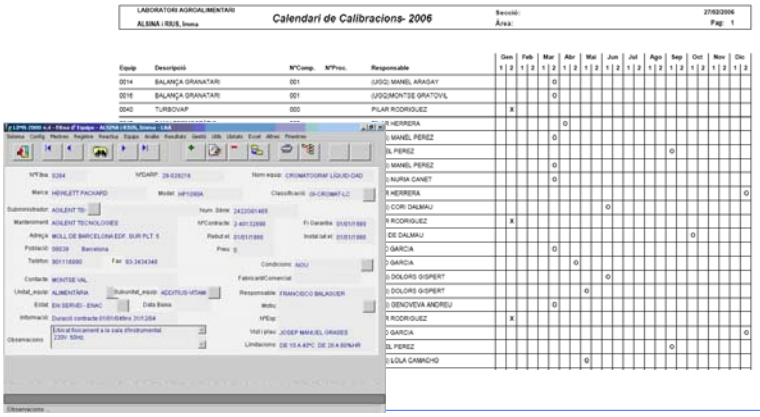
Planning

- Calibration and maintenance of equipment

Calibration/maintenance planning

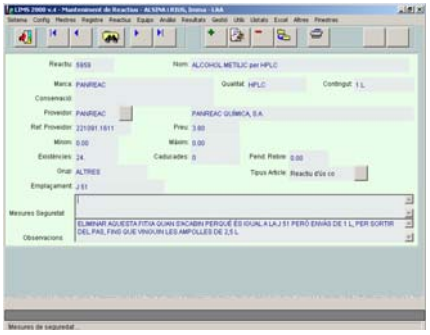
Calibration/maintenance planning

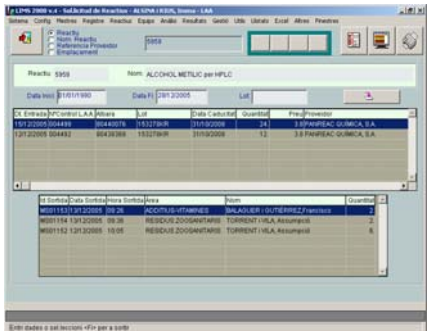


Planning

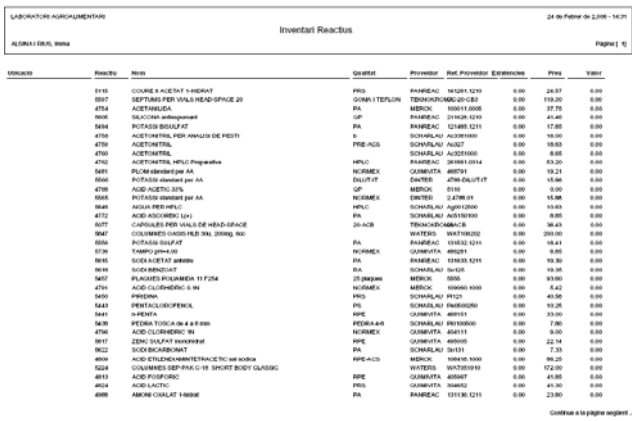
- Calibration and maintenance of equipment
- Inventory of reagents or chemicals

Inventory of chemicals





Inventory of chemicals

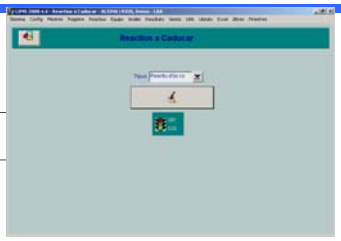


Inventari Reactius

Planning

- Calibration and maintenance of equipment
- Inventory of reagents or chemicals
- Control of expiry of chemicals

Control of chemicals to expiry



LABORATORI AGROALIMENTARI

REACTIVOS A CADUCAR

ALSINA i RIUS, Imma

24/02/2006

Ubicació	Reactiu	Nom	Qualitat	Exist.	Cad.	15 dies	1 mes	2 messos	3 messos
C 014	4794	ACID CLORHIDRIC 1N (BAKER	VALORACI	1.0	1.0	0.0	0.0	0.0	0.0
D 051	5737	TAMPO pH=4.01	REAGENT	1.0	0.0	1.0	0.0	0.0	0.0
E 037	4903	AIGUA OXIGENADA 30%	PA	5.0	5.0	0.0	0.0	0.0	0.0
F 010	4971	AMONI FOSFAT dibasic	RPE-ACS	1.0	0.0	1.0	0.0	0.0	0.0
F 073	5515	CICLOHEXA ANALISI PESTI	PA	6.0	3.0	0.0	0.0	0.0	3.0
G 023	5619	SODI BICARBONAT	RPE-ACS	3.0	0.0	0.0	0.0	1.0	0.0
G 033	5638	SODI CLORUR	PA	2.0	0.0	0.0	0.0	0.0	2.0
I 40	5440	n-PENTA	RPE	8.0	2.0	0.0	0.0	0.0	0.0
K 24	5236	FORMALDEHID 35-40%	PA	2.0	2.0	0.0	0.0	0.0	0.0
M 19	4785	ACID CITRIC monohidratat	PA	1.0	0.0	1.0	0.0	0.0	0.0
O 107	5798	VIALS CHROMACOL Ref 09-	CROMATOG	10.0	0.0	0.0	0.0	0.0	1.0
P 24	5606	SILICONA pasta A	QP	2.0	1.0	0.0	0.0	0.0	0.0

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Security

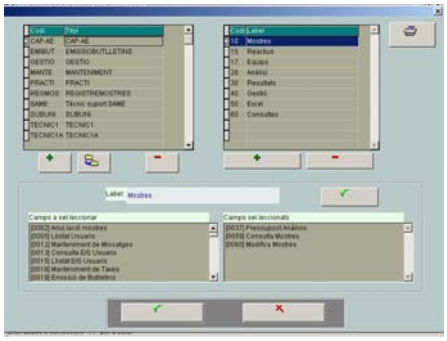
- A LIMS must guarantee that the stored data is safe.
- A key piece in the management of the traceability must be a incorruptible system.

Integrity

Robustness

Security

- 1 system administrator and different levels of access.



Security : validation of LIMS

- **Design control**
- **Functional control**
- **Operational control**
- **Integrity of data**

Security : validation of LIMS

- Validation of operational and functional design


Certificado de verificación/validación de sistema informático

CERTIFICA


La Divisió de Laboratoris de SAME, sistemes informàtics, S.A.

CERTIFICA

Que

Imma Alsina Rius

del Laboratori Agrari del D.A.R.P.

ha assistit al Curs de Formació

Administració Tècnica del Sistema Lims 2000i

Barcelona, 12 de desembre de 2005

SAME

Security : validation of LIMS

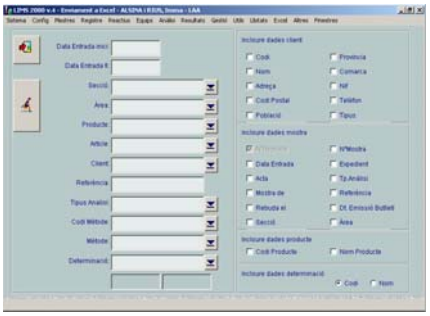
- The validation of a LIMS must incorporate these two aspects robustness and integrity of the data and can be made by choosing a data set, that we will adopt like patterns and verifying its stability in time.

Continuous Validation **Operational Control**

Statistical studies

- It is a powerful tool of a LIMS that allows flexibility in the management and the use of the data stored in the data base.
- The data stored in the LIMS can be transferred to Excel spreadsheets .

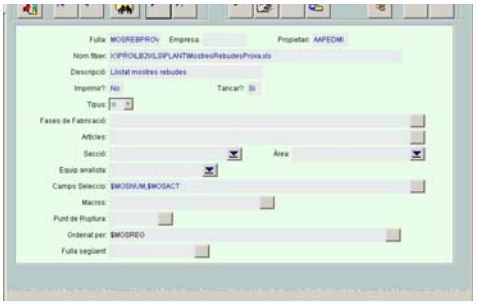
Transfer of data to Excel



- Possibility of choosing the data to export based on multiple criteria.

Design of patterns

- Customized design of the data to export and later treatment with Excel.



LIMS evolution in the Laboratori Agroalimentari - DARP

1997

- Operative processes: From the reception of the sample to the issuing of the results report
- Support processes: Module of reagents and module of equipment.
- Strategic processes: Management of the quality system

2006

Changes in processes ⇨ **Changes in LIMS**

Conclusions

- It allows better planning of work.
- It facilitates the registration of primary data and its traceability in general.
- It saves time, it reduces the tasks of administration and management of the information.
- It reduces errors in the registration of samples and the global management of data. It facilitates the unequivocal numeration of samples.
- It automatically makes the tasks of generation of test reports, receipts, labels, etc. that fulfill the requirements of the norm.

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Conclusions

- Control and manage the warehouse of reagents and chemicals, standards and expendable equipment.
- It allows a controlled and defined access to the information.
- It controls and it manages the calibration plan, verification and maintenance of the instrument equipment of the laboratory.
- It offers a great security and speed in information searches.

Conclusions

- LIMS is an indispensable tool for the management of the laboratory in ISO17025 framework.