1. **Basic information**

1.1 **Désirée Number:** PL01.04.05  
**Twinning number:** PL/IB/2001/AG/05

1.2 **Title:** Animal Feeding Stuff Control System

1.3 **Sector:** Agriculture

1.4 **Location:** Poland

2. **Objectives**

2.1. **Wider objective**
Development of the feeding stuff control system and its adjustment to the EU requirements through implementation of regulations to the act on feeding stuffs (regulation issued by the Minister of Agriculture and Rural Development)

2.2. **Immediate objectives**
Development of methodology of laboratory practices in identification and precise determination of the contents of elements, which affect the quality of feed additives, premixes and feed mixes (handbooks, guide-lines, instructions) for the needs of administrative feeding stuff control organs. Implementation of the system of animal feeding stuff supervision and control and its adjustment to the EU requirements on the production, processing and utilisation stage. Achievement by the Polish control organs of the level and operation efficiency compatible with EU standards.

2.3. **Accession Partnership and NPAA Priority**
The Polish Government adopted a priority defined as task 11 “Common Organisation of the Fodder Market” in the NPAA: “Adjustment to the Community requirements on quality requirements for animal feeding stuffs, additives and premixes, rules on production, marketing and rules on the control of animal feeding by harmonisation of legislation in this area.”

This priority is also included in the AP in a medium-term perspective: implementation of the phytosanitary and veterinary administration border inspection posts development programme; completion of the system of animal identification; implementation of the quality control system (Hazard Analysis Critical Control Point), animal waste treatment, modernisation of meat and dairy plants, residue and zoonosis control programmes; completion of inspection systems on future external borders; implementation of the national laboratory plan for testing and diagnostic facilities. Feeding stuff quality control is included in “the quality control system” and “implementation of the national laboratory plan for testing and diagnostic facilities”.

2.4. **Contribution to National Development Plan** : Not applicable.

2.5. **Cross Border Impact** : Not applicable

3. **Description**

3.1. **Background and Justification**
At present, the feeding stuff quality issues are regulated by the July 13th, 1939 Law on the Supervision of Certain Animal Feeding Stuffs and the November 5th, 1952 regulation by the Minister of Agriculture, on the supervision of certain animal feeding stuffs. Due to the lapse of time since their enforcement, the above mentioned regulations became outdated. Also, they do not regulate matters resulting from the progress achieved in animal feeding. The future membership of Poland to the EU required work on harmonisation of the law on quality requirements, production conditions, use and administrative control of feeding stuffs. Those actions call for implementation of regulations concerning: Quality requirements for feeds, feed additives and premixes in terms of the animal and animal product (meat, milk, eggs) consumer health protection; Technical, technological as well as production and marketing organisation conditions for feeds; and Development of a control system for the produced and marketed feeds, feed additives and premixes. The draft law on feeding stuffs, compatible with the EU legislation contained in Annex No 5 was developed (The draft of the law on feeding stuffs obtained a positive opinion on compatibility with the EU legislation from the Acting Secretary of the European Integration Office) and on April 21st it was sent to the Parliament together with the following implementing regulations: Regulation on the list of feed additives and feed materials, that could be produced and marketed without their former entry into the respective product registers; Regulation on detailed rules for feeding stuff sampling for analyses and setting the list of laboratories authorised to carry out such analyses; Regulation on the level of charges for examination of feed samples, feed additives and premixes taken within the framework of control executed by the Inspection of Marketing and Processing of Agricultural Products;
Regulation on the scope of additional feed and feeding material analyses required at the entry to the product registers and organisational units authorised to carry out such analyses; Regulation on determination of feed materials that will be marketed under a specified name; Regulation on detailed rules for labelling of feed additives, premixes and feeds; Regulation on the acceptable level of water content, binding substances, plant and mineral impurities in marketed feeds; and Regulation on determination of the list of substances banned from use as well as the admissible contents of undesirable substances in feeds. Under the regulations currently in force the control on feeding stuffs is executed by: Inspection of Marketing and Processing of Agricultural Products in the scope of market quality, Veterinary Inspection within the scope of sanitary quality, Obsolete laboratory equipment as well as staff shortages do not allow performance of the analyses in consistence with the EU (frequency, analytical scope) standards.

3.2. Linked activities
There have not been linked PHARE programmes yet. The project will not support farmers so there are no risks of overlapping with SAPARD.

3.3. Results
Adjustment and implementation of the feeding stuffs quality control system consistent with the EU standards; Implementation and application of uniform analytical procedures in line with the EU standards by the laboratories authorised to carry out administrative quality control of the feeding stuffs; Development and implementation of the reporting system for results of feed, feed additive and premix analyses in Poland, the reporting system for the European Commission together with the report templates; Duly equipped analytical laboratories; Possibilities for quick assessment of feeding stuffs; Professional control staff in place; Development of instructions, guidelines and handbooks on administrative control of feeding stuffs (sampling methodology, analytical procedures, result interpretation).

3.4. Activities/Inputs
Harmonisation of the Polish laboratory power in range of equipment operation, laboratory determinations, proper reading and interpretation of obtaining results.
It is intended that purchase of the equipment will be made according to Annex 6, in agreement with twinning partner (point 11). During realisation of the programme it is foreseen to train 160 persons belonging to laboratory staff. The twinning component will include the implementation of the following tasks: pre-purchase verification of laboratory equipment, verification of equipment procurement, co-ordination of the process of accreditation and project implementation, implementation of the animal feeding stuff quality control supervision system, organisation of inter-laboratory tests, laboratory system appraisal. The investment part will include the procurement of equipment in line with the EU legislative requirements.

3.5. Input
Long-term expert (PAA): the expert will be responsible for the overall supervision of project implementation; will assist with co-ordination of the accreditation process and implementation of the project; implementation of the feeding stuff supervision system in line with the EU requirements; etc. The PAA should therefore have operational experience with some or all of the items listed above.
First short-term expert: development of a laboratory staff training programme, manuals, brochures, instruction materials, participation in training delivery, practical and theoretical training for laboratory staff in Poland; periodical evaluation of the trained staff skills; supervision of verification of the equipment specified in the annex; organisation of inter-laboratory tests; data processing computer program in respect of data collection and transmission to EU. Requirements: fluency in the Polish, English or German language; 10 year experience in the accreditation process and development of technical specifications; level education; good knowledge of instrument methods; experience in didactics.
Second short-term expert: development, implementation and supervision of a reporting system in Poland as well as to EU, report transmission to EU and within Poland; delivery of training for the staff on reporting. Requirements: fluency in the Polish, English or German language; 5 year experience in the accreditation process and development of technical specifications; university level education; good knowledge of statistic methods; knowledge of preparation rules of reporting system; experience in report development. During project implementation training for 160 persons is foreseen.
Equipment procurement (see Annex 6).

4. Institutional Framework
The institutional framework of the control system was specified in the draft law on animal feeding stuffs. Control shall be executed by the Inspection of Marketing and Processing of Agricultural Products within the scope of the market quality of feeds, feed additives and premixes; and Veterinary Inspection within the scope of the sanitary quality of the above mentioned feeding stuffs. Based on these two inspections an official feeding stuff control system shall be established as well as a monitoring and a test result reporting system. The Inspections are government bodies, called into being by laws and within their statutory obligations they carry official control of the quality of feeding stuffs. The Draft of the regulation by the Minister of Agriculture and Rural Development that forms an enclosure to the draft law comprises the list of laboratories authorised do carry out analyses within the official control of feeds, feed additives and premixes.

Target Institutions: The Ministry of Agricultural and Rural Development, the General Inspectorate of Marketing and Processing of Agricultural Products the Central Feed Stuff Laboratory in Lublin. The project is addressed to 16 regional laboratories reporting to the Inspection of Marketing and Processing of Agricultural Products in Szczecin, Białystok, Bydgoszcz, Gdansk, Katowice, Kielce, Kraków, Lublin, Łódź, Olsztyn Opole, Poznan, Rzeszów, Warsaw, Zielona Góra and to the Central Laboratory of the Inspection in Warsaw and the Central Feed Stuff Laboratory in Lublin.

Within the market quality control system the law provides for the establishment of 2 reference laboratories, that shall have capacity to carry out full analyses of feeding stuffs. Their basic tasks include carrying out specialised analyses for the needs of cases of appeal and arbitration, as well as controlling the efficiency of laboratories operating on the standard level.

Ministry of Agriculture and Rural Development will be responsible for the project. Analytical equipment procurement will be supervised by the long-term expert. Central Laboratory of the General Inspectorate of Marketing and Processing of Agricultural Products and the Central Feed Stuff Laboratory in Lublin will become owner of the equipment.

5. Detailed Budget

<table>
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</table>

The co-financing funds for the project implementation will be available.

6. Implementation Arrangements

6.1 Implementing Agency:
PAO: Mr Pawel Samecki Under-secretary of State in the Office of the European Integration Committee, Aleje Ujazdowskie 9, Warszawa; phone 48 22 4555241; fax 48 22 4555243.
The CFCU is responsible for handling the tendering, contracting and payments of contracts on behalf of the Ministry of Agriculture and Rural Development.

6.2. Twinning
Technical assistance to analytical laboratories is aimed at improvement of the evaluation process in respect of feeding stuffs. This part of the project will be introduced under a twinning agreement. The foreseen employment is one long term expert for 24 months and two short-term experts, one for 12 months, and the second for 6 months. The experts will be based at the Ministry of Agriculture and Rural Development. Contact person: Mr Marian Borek Vice-Manager of Department of Agricultural Production in Ministry of Agricultural and Rural Development, 30 Wspólna St., 00-930 Warszawa; tel. +48 22 6232554, fax. +48 22 6232105.

6.3. Non-standard Aspects:
DIS will be followed.

6.4. Contracts
1. Investment – 5,0M€ (co-financed from the national budget – 2,2M€)
2. Twinning covenant (including training) – 2M€ (co-financed from the national budget - 0,8M€)

7. Implementation schedule
7.1 Commencement of Tendering: The first quarter of 2002.
7.2 Commencement of Project Activities: The first quarter of 2001 - Twinning
7.3 Project Completion: The fourth quarter of 2003
8. Equal Opportunities
The participation of women results from the employment structure. The participation of women will be measured with the percentage index of the number of persons participating in the training and seminars. No sex discrimination will be exercised. The participation of women and men will be based on the relevant European Community Equal Opportunity of Employment standard.

9. Environment: N/A
10. Rates of Return: N/A

11. Investment Criteria
Equipment procurement will follow the technical specification (Annex 6) and will be agreed upon with the twinning partners. For a number of years after the completion of programme implementation, Poland will be covering the costs of operation and maintenance of the infrastructure on an appropriate level, necessary repairs of laboratory equipment and training of staff.

12. Conditionality and Sequencing
12.1 Project Implementation Pre-conditions
- Adoption of the act of Parlament,
- Implementation of executive regulations,
- Training courses,
- Furnishing the laboratories with analytical-testing equipment meeting the EU requirements.

12.2 Sequence of Proposed Actions
- Development of technical specifications for tendering procedures
- Laboratory equipment procurement
- Staff training on equipment operation and effective use.
Under the twinning co-operation
- Establishment of working contacts
- Designing and delivery of training in Poland,

Project Benchmarks
* adoption of the act - 2nd quarter of 2001
* training – 4th quarter 2001 – 4th quarter 2003
* procurement of equipment – 3rd quarter of 2002 – 4th quarter of 2003
* executive acts – 4th quarter of 2002
### Project Title: Animal Feeds Control System

**Project No. PL01.04.05**

**End Contracting:** 15/12/2003 - **End Disbursement:** 15/12/2004

**Total Budget of the Project:** Total Eur -10.0

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**Project Title:** Animal Feeds Control System

**Total Budget of the Project:** Total Eur -10.0

<table>
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<th>Wider Objective</th>
<th>Index of Achievement</th>
<th>Sources of Information</th>
<th>Assumptions and Risk Factors</th>
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<tr>
<td>Development and adjustment to the EU requirements of the control system on feeding stuffs through implementation of regulations to the law on feeding stuffs</td>
<td>Development and implementation of legal regulations; adjustment of the activities and effectiveness of the animal feeding stuff control body to EU requirements</td>
<td>Published legal acts; analyses and evaluations conducted by Inspection of Marketing and Processing of Agricultural Products and Veterinary Inspection and by EU expert</td>
<td>The Polish party fully appreciated the need to adjust the law in the field of the fodder to Community requirements</td>
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**Immediate Objective**

**Achievement Indices**

- * Conclusion of co-operation agreements
- * Adjustment of the supervision system to the EU standards
- * Conducting tests of animal feeding stuffs according to requirements of the EU
- * Staff skill development

**Sources of Information**

- Published legal acts
- Analyses and evaluations conducted by Inspection of Marketing and Processing of Agricultural Products and Veterinary Inspection and by EU expert

**Assumptions and Risk Factors**

- Equipment of testing units with professional laboratory equipment
- Animal feeding stuff control implementation according to uniform methods valid in the EU

**Results**

**Index of Achievement**

- Uniform feeding stuff supervision and control system harmonised with EU standards. System of reporting within the country and to the European Commission. Proper furnishing of analytical laboratories by procurement of laboratory equipment according to the attached specification. Well prepared personnel in the supervising and control institution. Instructions, indicators, manuals

**Sources of Information**

- Appropriate documents
- Periodical analyses
- Evaluations of experts

**Assumptions and Risk Factors**

- In-depth knowledge of regulation and organisation structures which are in force in the EU. Proper use of examples given by MS. Implementation of EU patterns due to national conditions.
- Employment stability of personnel trained on methodology of analytical treatment implementation and use of laboratory equipment.

**Actions**

- Professional competence of trainers
- Development and financing of training materials and training for workers of supervision and control body
- Preparation of logistic and administrative facilities for training
- Delivery of laboratory equipment

**Inputs**

- Technical assistance in furnishing laboratories with professional equipment for feeding stuff testing; Training in analytical methodologies in line with EU standards; Training of laboratory staff in operating laboratory equipment, labelling, proper result reading and interpretation; Equipment procurement (Annex 6).

**Sources of Information**

- Periodical reports and reports on the program implementation

**Assumptions and Risk Factors**

- Respective training topics
- High class laboratory equipment
- Professional executor
Annex 2-4:  
Cumulative implementation, contracting and disbursement schedule

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<td>6.1</td>
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</tr>
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</table>

Legend: D = design of sub-project / C = tendering and contracting / I = contract implementation

Date of preparation: August 2000
Planning period: 9/2001-12/2003
Animal Feeds Stuff Control System
Total Budget 10 MEUR
Phare: 7 MEUR
Annex 5: BASIC EU LEGAL ACTS REFERRING TO ANIMAL FEEDING STUFFS

1. Council Decision of July 20th, 1970, on the establishment of the Standing Fodder Committee (OJ L 170 03.08.70, p. 1)
15. Commission Directive 95/10/EC of April 7th, 1995, determining the method of calculating the calorific value of fodder for dogs and cats, for special feeding purposes (OJ L 091 22.04.95, p. 39)
Annex 6: SPECIFICATION OF PROCUREMENT ITEMS

Laboratories of the standard analyses (Inspection of Marketing and Processing of Agricultural Products)
feed mills 32 pcs., separator of samples – 16 pcs.
laboratory sieves, shaker 16 sets
electronic scales 32 pcs.
scales-dryer 16 pcs.
air drier 16 pcs
drier 16 pcs
oven for incineration 16 pcs
nitrogen analyzer with a mineralizer 16 pcs
fat analyzer 16 pcs
fibre analyzer 16 pcs
polarimeter 16 pcs
spectrophotometer of the atomic absorption
flame macroelements Ca, Na, Mg, K 16 pcs
water bath 16 pcs
spectrophotometer 16 pcs
pH-meter 16 pcs
vacuum vaporizer 16 pcs
water distiller 16 pcs
PC computer, integrators – 16 pcs
Small laboratory equipment: automatic pipettes – 32 pcs, automatic burettes – 32 pcs

Specialist laboratories
Aminoacid analyzer - 2 pcs
Gas chromatograph with a sample feeder – 2 pcs
UV-VIS spectrophotometer – 2 pcs
Microwave oven – 2 pcs
Spectrophotometer of the atomic absorption – 2 pcs
Ionic chromatograph – 4 pcs
HPLC chromatograph – 6 sets
Set for ELISA tests -2 pcs
Water deionizator -2 pcs
PC computer, integrators – 2 pcs
Photocopy – 2 pcs
Ultrasound bath, vacuum pumps, small equipment, equipment for microbiological analyses, autoclave - 2 sets
UV lamp, lamp table – 2 sets
Laboratory mills – 6 pc
Small laboratory equipment: automatic pipettes – 6 pcs, automatic burettes – 10 pcs, pH –meter – 4 pcs, analytic scales – 4 pcs, water bath 4 pcs, drier 4 pcs, oven – 4 pcs, vacuum vaporier 4 pcs

The laboratory equipment specification was based on the following Directives:


Moreover, the analytical method standards were used for laboratory equipment specifications. These standards are the translations of respective European Standards (e.g.: PN-93/R-64750 - translation of ES IDT ISO 6490-1; PN-93/R-64770 - equivalent to ES ISO 6498:1983)


1. DETERMINATION OF HYDROCYANIC ACID
   a) Oven with thermostat set at 38 °C.
   b) Apparatus for distillation by entrainment in steam fitted with a condenser with a curved extension piece.
   c) 1000 ml flat-bottomed flasks with ground-glass stoppers.
   d) Oil bath.

Burette graduated in 1/20 ml.

2. DETERMINATION OF CALCIUM
   a) Electric muffle-furnace with air circulation and thermostat.
   b) Platinum, silica or porcelain crucibles for ashing.
   c) Glass filter crucibles of G4 porosity.

3. DETERMINATION OF CARBONATES
   a) Scheibler-Dietrich apparatus or equivalent apparatus.

4. DETERMINATION OF CRUDE ASH
   a) Hot plate.
   b) Electric muffle-furnace with thermostat.
   c) Crucibles for ashing made of platinum or an alloy of platinum and gold (10 % Pt, 90 Au), either rectangular (60 x 40 x 25 mm) or circular (diameter : 60 to 75 mm, height : 20 to 25 mm).

5. DETERMINATION OF ASH WHICH IS INSOLUBLE IN HYDROCHLOORIC ACID
   a) Hot plate.
   b) Electric muffle-furnace with thermostat.
   c) Crucibles for ashing made of platinum or an alloy of platinum and gold (10 % Pt, 90 % Au), either...
rectangular (60 × 40 × 25 mm) or circular (diameter 60 to 75 mm, height : 20 to 25 mm).

6. DETERMINATION OF CHLORINE FROM CHLORIDES
a) Mixer (tumbler) : approximately 35 to 40 rpm

7. DETERMINATION OF LACTOSE
a) Water bath with thermostat set at 38 – 40 °C.

8. DETERMINATION OF POTASSIUM
a) Platinum, silica or porcelain crucibles for ashing, provided if necessary with lids.
b) Electric muffle-furnace with thermostat.
c) Flame photometer.

9. DETERMINATION OF SODIUM
a) Platinum, silica or porcelain crucibles for ashing, provided if necessary with lids.
b) Electric muffle-furnace with thermostat.
c) Flame photometer.

10. DETERMINATION OF SUGAR
Mixer (tumbler) : approximately 35 to 40 rpm.

11. DETERMINATION OF UREA
a) Mixer (tumbler) : approximately 35 to 40 rpm.
b) Test tubes : 160 × 16 mm with ground-glass stoppers.
c) A spectrophotometer.

12. DETERMINATION OF LUPIN ALKALOIDS
a) Mechanical stirrer.
b) Platinum, silica or porcelain crucibles for ashing.
c) Electric muffle-furnace.

13. ESTIMATION OF THE UREASE ACTIVITY OF PRODUCTS DERIVED FROM SOYA
a) Potentiometric titration apparatus or high sensitivity pH-meter (0 702 pH) with magnetic stirrer.
b) Water bath fitted with thermostat set at 30 °C exactly.
c) Test-tubes with ground-glass stoppers, 150 × 18 mm.


1. DETERMINATION OF AMPROLIUM
a) HPLC equipment with injection system.
b) Liquid chromatographic column 125 mm x 4 mm,
c) UV detector with variable wavelength adjustment or diode array detector.
d) Membrane filter, PTFE material, 0,45.
e) Membrane filter, 0,22.
f) Ultrasonic bath.
g) Mechanical shaker or magnetic stirrer.

2. DETERMINATION OF DICLAZURIL
a) Mechanical shaker.
b) Equipment for ternary gradient HPLC.
c) Liquid chromatographic column, Hypersil packing, 100 mm x 4,6 mm, or equivalent.
d) UV detector with variable wavelength adjustment or diode array detector.
e) Vacuum rotary evaporator.
f) Membrane filter, 0,45.
g) Vacuum manifold.
h) Ultrasonic bath.

3. DETERMINATION OF CARBADOX
a) Laboratory shaker or magnetic stirrer.
b) Glass fibre filter paper (Whatman GF/A or equivalent).
c) Glass column (length 300 to 400 mm, internal diameter approximately 10 mm) with sintered glass frit and draw-off valve.
d) HPLC equipment with injection system, suitable for injection volumes of 20,
e) Liquid chromatographic column: 300 mm x 4 mm, C18, 10 >ISO_7 packing or equivalent.
f) UV detector with variable wavelength adjustment or diode array detector operating in the range of 225 to 400 nm.
g) Membrane filter, 0,22.
h) Membrane filter, 0.45.
i) Ultrasonic bath.

1. DETERMINATION OF MOISTURE
   a) Crusher of non moisture-absorbing material which is easy to clean, allows rapid, even crushing without producing any appreciable heating, prevents contact with the outside air as far as possible and meets the requirements laid down in 4.1.1. and 4.1.2. (e.g. hammer or water-cooled micro-crushers, collapsible cone mills, slow motion or cogwheeled crushers).
   b) Analytical balance, accurate to 0.75 mg.
   c) Dry containers of non-corrodible metal or of glass with lids ensuring airtight closure; working surface allowing the test sample to be spread at about 0.73 g/cm².
   d) Electrically heated isothermal oven (± 1 °C) properly ventilated and ensuring rapid temperature regulation.
   e) Adjustable electrically heated vacuum oven fitted with an oil pump and either a mechanism for introducing hot dried air or a drying agent (e.g. calcium oxide).
   f) Desiccator with a thick perforated metal or porcelain plate, containing an efficient drying agent.
2. DETERMINATION OF VOLATILE NITROGENOUS BASES
   A. Microdiffusion
      a) Mixer (tumbler) : approximately 35 to 40 r.p.m.
      b) Glass or plastic Conway cells (see diagram).
      c) Microburettes graduated in 1/100 ml.
   B. By distillation
      a) Mixer (tumbler) : approximately 35 to 40 r.p.m.
      b) Distilling apparatus of the Kjeldahl type.
   3. DETERMINATION OF TOTAL PHOSPHORUS
      PHOTOMETRIC METHOD
      a) Silica or porcelain ashing crucibles.
      b) Electric muffle-furnace with thermostat set at 550 °C.
      c) 250 ml Kjeldahl flask.
      d) Graduated flasks and precision pipettes.
      e) Spectrophotometer.
      f) Test tubes about 16 mm in diameter, with stoppers graded to a diameter of 14.75 mm; capacity: 25 to 30 ml.

1. DETERMINATION OF AMINO ACIDS
   a) Amino acid analyzer
2. DETERMINATION OF CRUDE OILS AND FATS
   a) Extraction apparatus. If fitted with a siphon (Soxhlet apparatus), the reflux rate should be such as to produce about 10 cycles per hour; if of the non-siphoning type, the reflux rate should be about 10 ml per minute.
   b) Extraction thimbles, free of matter soluble in light petroleum.
   c) Drying oven, either a vacuum oven set at 75 °C ± 3 °C or an air-oven set at 100 °C ± 3 °C.
3. DETERMINATION OF OLAQUINDOX
   a) Ultrasonic bath.
   b) Mechanical shaker.
   c) HPLC equipment with variable wavelength ultraviolet detector or diode array detector.
   d) Liquid chromatographic column, 250 mm × 4 mm, C18, 10 im packing, or equivalent.
   e) Membrane filters, 0.45 im.

1. DETERMINATION OF CRUDE PROTEIN DISSOLVED BY PEPsin AND HYDROCHLORIC ACID
   a) water bath or incubator, set at 40°c more or less 1°c.
   b) Kjeldahl digestion and distillation apparatus.
   c) water bath set at 25°C more or less 0.1°C by ultrathermostat.
   d) spectrophotometer.
   e) chronometer, accuracy: 1 second.
   f) pH-meter.
   g) mixer (tumbler): approximately 35 rpm.
   h) Spectrophotometer.

2. DETERMINATION OF FREE AND GOSSYPOL
   a) mixer (tumbler) : approximately 35 rpm.
   b) spectrophotometer


1. DETERMINATION OF CRUDE PROTEIN
   a) Apparatus suitable for performing digestion, distillation and titration according to the Kjeldahl procedure.


1. DETERMINATION OF STARCH - POLARIMETRIC METHOD
   a) 250 ml erlenmeyer flask with standard ground-glass joint and with reflux condenser.
   b) Polarimeter or saccharimeter.


1. DETERMINATION OF MOISTURE IN ANIMAL AND VEGETABLE FATS AND OILS
   a) Flat-bottomed dish, of a corrosion-resistant material, 8 to 9 cm in diameter and approximately 3 cm high.
   b) Mercury thermometer with a strengthened bulb and expansion tube at the top end, graduated from approximately 80 °C to at least 110 °C, and approximately 10 cm in length.
   c) Sand bath or electric hot-plate.
   d) Desiccator, containing an efficient drying agent.
   e) Analytical balance.

2. DETERMINATION OF MAGNESIUM - by atomic absorption spectrophotometry
   a) Platinum, silica or porcelain ashing crucibles.
   b) Thermostatically controlled electric muffle furnace.
   c) Atomic absorption spectrophotometer.

3. DETERMINATION OF CRUDE FIBRE
   a) Beakers of at least 600 ml capacity, with measuring marks at the 200 ml level.
   b) Porcelain discs approximately 80 mm in diameter and approximately 4 mm thick, perforated with approximately 32 holes, each approximately 4 mm in diameter.
   c) Rubber-stoppered vacuum flasks of approximately 2 litre capacity, with measuring marks at the 800 ml level and fitted with glass funnels 120 mm in diameter.
   d) Filter plates approximately 40 mm in diameter and approximately 4 mm thick, with slanting edges to fit the cone of the funnel (4.3), perforated with approximately 16 holes, each approximately 4 mm in diameter, and covered by a wire mesh, the mesh size being approximately 1 mm. Both plates and wire mesh must be resistant to acids and alkanals.
   e) Platinum or silica ashing crucibles.
   f) Thermostatically controlled electric muffle furnace.
   g) Desiccator.
   h) Asbestos filter: Suspend 2 70 g asbestos in 100 ml water.
Filter under vacuum over a filter plate covered with a wire mesh and placed in the funnel of a vacuum flask. Collect the filtrate and filter once more through the same filter. Discard the filtrate.

4. DETERMINATION OF RETINOL (VITAMIN A)
   Water bath.
   a) Vacuum evaporation apparatus with round flasks of different capacities.
   b) Glass chromatography tubes (length: 300 mm; internal diameter: about 13 mm).
   c) Spectrophotometer with 10 mm cells. Measurements in the UV require silica cells.
   d) UV lamps suitable for 365 nm.


1. DETERMINATION OF AFLATOXIN B1
   A. ONE-DIMENSIONAL THIN LAYER CHROMATOGRAPHIC METHOD
   a) Grinder-mixer.
   b) Shaking apparatus or magnetic stirrer.
   c) Fluted filter papers, Schleicher and Schüll No 588 or equivalent, diameter: 24 cm.
   d) Glass tube for chromatography (internal diameter : 22 mm, length : 300 mm), with a PTFE cock and a 250-ml reservoir.
   e) Rotary vacuum evaporator, with a 500-ml round-bottom flask.
   f) 500-ml conical flasks, with ground-glass stoppers.
   g) TLC apparatus.
   h) Glass plates for TLC, 200 x 200 mm, prepared as follows (the quantities indicated are sufficient to cover five plates). Put 30 g of silica gel G-HR (3.15) into a conical flask. Add 60 ml water, stopper and shake for a minute. Spread the suspension on the plates so as to obtain a uniform layer 0.725 mm thick. Leave to dry in the air and then store in a desiccator containing silica gel. At the time of use, activate the plates by keeping them in the oven at 110 ºC for one hour. Ready-to-use plates are suitable if they give results similar to those obtained with the plates prepared as indicated above.
   i) Long-wavelength (360 nm) UV lamp. The intensity of irradiation must make it possible for a spot of 1 ng of aflatoxin B1 to be still clearly distinguished on a TLC plate at a distance of 10 cm from the lamp.
   j) 10 ml graduated tubes with polyethylene stoppers.
   k) UV spectrophotometer.
   l) Fluorodensitometer (optional).
   B TWO-DIMENSIONAL THIN LAYER CHROMATOGRAPHIC METHOD


1. DETERMINATION OF THE TRACE ELEMENTS IRON, COOPER, MANGANESE AND ZINC
   a) Muffle furnace with temperature regulation and recorder.
   b) Glassware must be of resistant borosilicate type and it is recommended to use apparatus which is reserved exclusively for trace element determinations.
   c) Platinum crucible and (optional) quartz crucible.
   d) Atomic absorption spectrophotometer meeting the requirements of the method with regard to sensitivity and precision in the required range.


1. DETERMINATION OF MONENSIN SODIUM BY DIFFUSION IN AN AGAR MEDIUM
   a) Rotary vacuum evaporator, with a 250 ml round-bottom flask.
   b) Glass tube for chromatography, internal diameter : 25 mm, length : 400 mm, with an open end of 2
mm diameter.
c) Glass tube for chromatography, internal diameter : 11 mm, length : approximately 300 mm, with an open end of 2 mm diameter.


1. DETERMINATION OF HALOFUGINONE
   a) Ultrasonic bath.
   b) Rotary film evaporator.
   c) Centrifuge.
   d) HPLC equipment with variable wavelength ultraviolet detector or diode-array detector.
   e) Liquid chromatographic column, 300 mm × 4 mm, C 18, 10 mm packaging, or an equivalent column.
   f) Glass column (300 mm × 10 mm) fitted with a sintered-glass filter and a stopcock.
   g) Glass-fibre filters, diameter 150 mm.
   h) Membrane filters, 0,45 mm.
   i) Membrane filters, 0,22 mm.

1. DETERMINATION OF ROBENIDINE
   a) Glass column
      Constructed of amber glass fitted with a stopcock and a reservoir of approximately 150 ml capacity, internal diameter 10 to 15 mm, length 250 mm.
   b) Laboratory wrist-action shaker.
   c) Rotary film evaporator.
   d) HPLC equipment with variable wavelength ultraviolet detector or diode array detector operating in the range of 250 to 400 nm.
   e) Liquid chromatographic column: 300 mm × 4 mm, C18, 10 mm packing or equivalent.
   f) Glass fibre filter paper (Whatman GF/A or equivalent).
   g) Membrane filters, 0,22 mm.
   h) Membrane filters, 0,45 mm.
2. DETERMINATION OF METHYL BENZOQUATE
   a) Laboratory shaker.
   b) Rotary film evaporator.
   c) Glass column (250 mm × 15 mm) fitted with a stopcock and reservoir of approximately 200 ml capacity.
   d) HPLC equipment with variable wavelength ultraviolet detector or diode-array detector.
   e) Liquid chromatographic column: 300 mm × 4 mm, C-18, 10 mm packing or equivalent.
   f) Membrane filters, 0,22 mm.
   g) Membrane filters, 0,45 mm.

a) analytical balance (accuracy of 0,001 g),
b) material for grinding (rasp, mill, etc),
c) Sieve fitted with sieve mesh with square meshes of width 0,1 to 2 mm,
d) Steremicroscope (up to 50 magnification),
e) Compound microscope (up to 400 magnification) transmitted light/polarised light,
f) Standard laboratory glassware.

1. DETERMINATION OF AMPROLIUM
a) HPLC equipment with injection system, suitable for injection volumes of 100.
b) Liquid chromatographic column 125 mm x 4 mm, cation exchange Nucleosil 10.
c) UV detector with variable wavelength adjustment or diode array detector.
d) Membrane filter, PTFE material, 0,45.
e) Membrane filter, 0,22.
f) Ultrasonic bath.
g) Mechanical shaker or magnetic stirrer.

2. DETERMINATION OF DICLAZURIL
a) Mechanical shaker.
b) Equipment for ternary gradient HPLC.
c) Liquid chromatographic column, Hypersil packing, 100 mm x 4,6 mm, or equivalent.
d) UV detector with variable wavelength adjustment or diode array detector.
e) Vacuum rotary evaporator.
f) Membrane filter, 0,45.
g) Vacuum manifold.
h) Ultrasonic bath.

3. DETERMINATION OF CARBADOX
a) Laboratory shaker or magnetic stirrer.
b) Glass fibre filter paper (Whatman GF/A or equivalent).
c) Glass column (length 300 to 400 mm, internal diameter approximately 10 mm) with sintered glass frit and draw-off valve.
   Note: a glass column fitted with a stopcock or a glass column with a tapered end may also be used; in this case, a small glass-wool plug is inserted into the lower end and it is tamped down using a glass rod.
d) HPLC equipment with injection system, suitable for injection volumes of 20.
e) Liquid chromatographic column: 300 mm x 4 mm, C18, 10 packing or equivalent.
f) UV detector with variable wavelength adjustment or diode array detector operating in the range of 225 to 400 nm.
g) Membrane filter, 0,22.
h) Membrane filter.
i) Ultrasonic bath.

1. DETERMINATION OF LASALOCID SODIUM
a) Ultrasonic bath (or shaking water-bath) with temperature control.
b) Membrane filters, 0,45.
c) HPLC equipment with injection system, suitable for injecting volumes of 20.
d) Liquid chromatographic column 125 mm [times ] 4 mm, reversed-phase C18, 5 packing or equivalent.
e) Spectrofluorimeter with variable wavelength adjustment of excitation and emission wavelengths.

1. DETERMINATION OF VITAMIN A
a) Vacuum rotary evaporator.
b) Amber glassware.
c) Flat bottom or conical flasks, 500 ml, with ground-glass socket.
d) Graduated flasks with ground-glass stoppers, narrow-necked, 10, 25, 100 and 500 ml.
e) Separating funnels, conical, 1000 ml, with ground-glass stoppers.
f) Pear shaped flasks, 250 ml, with ground-glass sockets.
g) Allihn condenser, jacket length 300 mm, with ground-glass joint, with adapter for gas feed pipe.
h) Pleated filter paper for phase separation, diameter 185 mm (e.g. Schleicher & Schuell 597 HY 1/2).
i) HPLC equipment with injection system.
j) Liquid chromatographic column, 250 mm x 4 mm, C18, 5 or 10 packing, or equivalent (performance
k) UV or fluorescence detector, with variable wavelength adjustment.
l) Spectrophotometer with 10 mm quartz cells.
m) Water-bath with magnetic stirrer.

n) Extraction apparatus (see figure 1) consisting of:
- Glass cylinder of 1 l capacity fitted with a ground glass neck and stopper
- Ground glass insert equipped with a side-arm and an adjustable tube passing through the centre. The adjustable tube should have a U-shaped lower end and a jet at the opposite end so that the upper liquid layer in the cylinder may be transferred into a separating funnel.

2. DETERMINATION OF VITAMIN E
a) Vacuum rotary evaporator.
b) Amber glassware
- Flat bottom or conical flasks, 500 ml, with ground-glass socket,
- Separating funnels, conical, 1000 ml, with ground-glass stoppers,
- Pear shaped flasks, 250 ml, with ground-glass sockets.
c) Allihn condenser, jacket length 300 mm, with ground-glass joint, with adapter for gas feed pipe.
d) Pleated filter paper for phase separation, diameter 185 mm (e.g. Schleicher & Schuell 597 HY 1/2).
e) HPLC equipment with injection system
- Liquid chromatographic column, 250 mm x 4 mm, C18, 5 or 10 packing, or equivalent,
- Fluorescence or UV detector, with variable wavelength adjustment.
f) Spectrophotometer with 10 mm quartz cells.
g) Water-bath with magnetic stirrer.

h) Extraction apparatus (see figure 1) consisting of:
- Glass cylinder of 1 l capacity fitted with a ground glass neck and stopper,
- Ground glass insert equipped with a side-arm and an adjustable tube passing through the centre. The adjustable tube should have a U-shaped lower end and a jet at the opposite end so that the upper liquid layer in the cylinder may be transferred into a separating funnel.

3. DETERMINATION OF TRYPTOPHAN
a) HPLC equipment with a spectrofluorimetric detector.
b) Liquid chromatographic column, 125 mm x 4 mm, C18, 3 m packing, or equivalent.
c) pH-meter.
d) Polypropylene flask, capacity 125 ml, with wide neck and screw cap.
e) Membrane filter, 0,45.
f) Autoclave, 110 (+- 2)°C, 1,4 (+- 0,1) bar.
g) Mechanical shaker or magnetic stirrer.
h) Vortex mixer.

APPARATUS AND EQUIPMENTS RECOMMENDED IN PN AND ISO STANDARDS FOR FEED ANALYSIS
a) amino acid analyzer comprising a temperature-controlled column fitted with a sulfonated polystyrene resin, buffer and ninhydrine pumps, an injector, a temperature-controlled reactor, a double photometer working at 570 nm and 440 nm, recorder-integrator,
b) pH meter, inaccuracy of at most 0,01 pH units,
c) centrifuge
d) rotary vacuum evaporator
e) vacuum pump
f) membrane filters

a) spectrometer UV-VIS
b) pH meter
c) centrifuge
d) grinding apparatus

3. PrPN-ENISO 14182:1999 Animal feeding stuffs. Determination of residues of
organophosphorus pesticides. Gas chromatographic method
a) gas chromatograph with flame photometric detector FPD or nitrogen-phosphorus detector NPD or mass selective detector MSD
b) capillary columns with mid-range polarity stationary phases e.g. SE-30, SE-54, OV-17 or equivalent standard glass columns
c) rotary vacuum evaporator
d) mechanical shaker
e) glass chromatographic tube with porosity plate

a) amino acid analyzer,
b) rotary vacuum evaporator,
c) oil baths.

5. PN-R-64786 Animal feeding stuffs. Determination of BHT, BHA and EQ
a) gas chromatograph with flame photometric detector
b) mechanical shaker
c) rotary vacuum evaporator

a) autoclave
b) incubator
c) mechanical shaker
d) apparatus for inhibition zone measure
e) pH meter
f) centrifuge
g) micropipettes
h) Petrie plates
i) Roux bottles

7. PN-93/R-66166 Determination of glucosinolates content in rapeseeds and rape meal by high performance liquid chromatography.
a) high performance liquid chromatograph comprising a UV detector, columns e.g. Lichnosorb type, RP18, 5 µm, 150 mm,
b) centrifuge
c) water bath
d) automatic pipettes and micropipettes