# UNIVERSIDAD NACIONAL
## JOSÉ FAUSTINO SÁNCHEZ CARRIÓN

# ARTÍCULO CIENTÍFICO


*Dr. Raúl Siche*

UNIVERSIDAD
NACIONAL DE TRUJILLO

Taller:

Formulación de Proyectos de Investigación Científica y/o Tecnológica

# 10 preguntas en la redacción de un artículo científico (AC)

1. ¿Cómo redactar un buen título?
2. ¿Quiénes deben ser autores de una publicación?
3. ¿Porqué la afiliación es importante?
4. ¿Cómo redactar un resumen?
5. ¿Qué aspectos deben aparecer en la introducción?
6. ¿Cómo cumplir con el criterio de reproducibilidad en la Metodología?
7. ¿Cómo discutir los resultados?
8. ¿Cómo concluir en un AC?
9. ¿A quién agradecer en un AC?
10. ¿Qué estilo utilizar para redactar las referencias bibliográficas?

# 10 preguntas en la redacción de un artículo científico (AC)

Importancia de publicar un AC

1. **¿Cómo redactar un buen título?**
2. **¿Quiénes deben ser autores de una publicación?**
3. **¿Porqué la afiliación es importante?**
4. **¿Cómo redactar un resumen?**
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7. **¿Cómo discutir los resultados?**
8. **¿Cómo concluir en un AC?**
9. **¿A quién agradecer en un AC?**
10. **¿Qué estilo utilizar para redactar las referencias bibliográficas?**

El camino de un AC hasta su publicación

# EL TÍTULO

Ecological Indicators 10 (2010) 475–483

Contents lists available at ScienceDirect

Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind

## Emergy Net Primary Production (ENPP) as basis for calculation of Ecological Footprint

Raúl Siche [a,*], Feni Agostinho [b], Enrique Ortega [b]

[a] Escuela de Ingeniería Agroindustrial – Facultad de Ciencias Agropecuarias, Universidad, Nacional de Trujillo, Av. Juan Pablo II s/n, C. Universitaria, Trujillo, Peru
[b] Ecological Engineering Laboratory, Food Eng. School, State University of Campinas, (Unicamp), Cx. Postal 6121, CEP 13083-862, Campinas, SP, Brazil

ARTICLE INFO

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*Keywords:*
Energy
Ecological Footprint
Emergy
Biocapacity
Peru
Thermodynamics

ABSTRACT

Society needs urgently good tools to understand the biosphere dynamics, become aware of Earth's biophysical limits and make appraisals of environmental performance of human dominated systems. In this context, the Ecological Footprint (EF) was suggested as one of the most important tools. But, according to calculations based on Emergy Analysis, the indicators of EF could underestimate the problem of human carrying support. EF does not consider the work of untouched nature in productivity and ecosystems services. In order to improve the EF results, the present study suggests: (a) to include the ecosystems not considered in conventional EF i.e. tundra, deserts and areas covered by ice; (b) to consider the value of Net Primary Production (NPP) in Emergy units (sej $m^{-2}$ $year^{-1}$) as the base for the calculation of Equivalent Factors (EQF); (c) to account for the consumption of fossil energy used in collection, treatment and distribution of water for domestic use, for this the carbon emissions data (in tonC $m^{-3}$ of water) were used. Introducing these changes to the conventional EF calculation and considering the Peruvian economy (in 2004) as the study case, the Biocapacity obtained was 14.31 gha $capita^{-1}$ and the footprint was 6.68 gha $capita^{-1}$. These values mean that Peru can support 2.14 times its population if the current life style is maintained, as opposed to the 4.0 times ratio obtained with a conventional EF calculation.



### 1. Introduction

The Ecological Footprint (EF) is a tool that is being used by the world-wide scientific community, as a result of its didactic form to transmit the impact of the society on nature through easy-to-understand measurement. There are two main reasons for which the EF has become very popular: it uses a mathematical formula to consider the effect of the consumption of society (Footprint) in its natural environmental (Biocapacity); and it incorporates a vast amount of information in a simple quantitative measure to express its results (land area in global hectares). The EF calculates Biocapacity as the availability in bioproductive land area and footprint as the consumption of the evaluated system, both in global hectares. Details of the calculations can be obtained in Monfreda et al. (2004).

As with the majority of the existing methods that evaluate the sustainability of systems and processes, the EF-GAEZ (called thus because it uses the Global model Agro-Ecological Zones of FAO) has been extensively criticized. Main inadequacies of the EF-GAEZ ability to measure the level of human impact are:

(a) It considers carbon emissions as area of forest necessary to absorb $CO_2$, but some carbon sequestering also occurs in areas of agriculture, pasture, ocean, and so on (Venetoulis and Talberth, 2008). Even though these areas absorb $CO_2$ to a lesser extend than forests, they need to be accounted for. Areas considered non-productive or with low productivity (mountains, deserts, tundra, and areas covered by ice) are not considered in EF-GAEZ (Venetoulis and Talberth, 2008), but they produce environmental services that must be accounted for in the Biocapacity. Nevertheless, the EF-GAEZ makes conservative estimates when sufficient data are not available.
(b) EF-GAEZ considers each area only once, although the same area may be supplying two or more ecological services. Only the forest areas are counted two times, one as bioproductive area to supply forest products and another as available area to absorb $CO_2$ emissions (Monfreda et al., 2004). Even so, the

*Abbreviations:* BC, Biocapacity; EF, Ecological Footprint; EF-GAEZ, EF based on GAEZ suitability indices; EF-NPP, EF approach that employs Net Primary Production; EF-ENPP, EF approach that employs Net Primary Production based on Emergy; EMA, Emergy Analysis; ENPP, Emergy Net Primary Production; EQF, Equivalence Factor; YF, Yield Factor; GAEZ, Global Agricultural Ecological Zone; GAP, Global Average Productivity; GDP, Gross Domestic Product; gha, global hectare (in this work gha means Peru's hectare); Gt C, $10^9$ ton of carbon; LCF, Load Capacity Factor; NPP, Net Primary Production; CGW, Continental and Glacial Water; REN, Renewability; sej, solar emjoules (unit measure of Emergy Analysis); Tr, solar Transformity.

* Corresponding author. Tel.: +51 44 294778; fax: +51 44 294778.
*E-mail address:* raul.siche@unitru.edu.pe (R. Siche).

1470-160X/$ – see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.ecolind.2009.07.018

## Concepto

Es la frase que con el **menor número posible** de palabras **describe adecuadamente** el contenido del artículo.

## Función

Que llame la atención.

# ¿CÓMO HAGO UN TÍTULO LLAMATIVO?

## Estrategia 1: iniciar con la(s) palabra(s) más importante(s)

ECOLOGICAL ECONOMICS 66 (2008) 628–637

available at www.sciencedirect.com

ScienceDirect

www.elsevier.com/locate/ecolecon

ELSEVIER


ANALYSIS

**Sustainability of nations by indices: Comparative study between environmental sustainability index, ecological footprint and the emergy performance indices**

*R. Siche* [a], *F. Agostinho* [b], *E. Ortega* [b,*], *A. Romeiro* [c]

[a] *Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, Ciudad Universitaria, Trujillo, Peru*

[b] *Laboratory of Ecological Engineering, FEA (College of Food Eng), Unicamp, CP 6121, CEP 13083-862, Campinas, SP, Brazil*

[c] *Núcleo de Economia Agrícola, NEA, UNICAMP, CP 6135, Campinas, SP, Brazil*

Palabras más importantes: SUSTENTABILIDAD DE NACIONES POR ÍNDICES

# ¿CÓMO HAGO UN TÍTULO LLAMATIVO?

## Estrategia 2: Incluir el aspecto más novedoso (diferenciación)

Food Research International 89 (2016) 701–708

Contents lists available at ScienceDirect

Food Research International

journal homepage: www.elsevier.com/locate/foodres


Ultrasound pre-treatment enhances the carrot drying and rehydration

Cinthia Ricce [a,b], Meliza Lindsay Rojas [a], Alberto Claudio Miano [a], Raul Siche [b], Pedro Esteves Duarte Augusto [a,*]

[a] Department of Agri-food Industry, Food and Nutrition (LAN), Luiz de Queiroz College of Agriculture (ESALQ), University of São Paulo (USP), Piracicaba, SP, Brazil
[b] Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Trujillo, LL, Perú

**Lo novedoso: MEJORA (Resultado)**

# ¿CÓMO HAGO UN TÍTULO LLAMATIVO?

## Estrategia 2: Incluir el aspecto más novedoso (diferenciación)

Meat Science 133 (2017) 43–50

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci


An application based on the decision tree to classify the marbling of beef by hyperspectral imaging

Lía Velásquez[a], J.P. Cruz-Tirado[a], Raúl Siche[a,*], Roberto Quevedo[b]

[a] Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, Ciudad Universitaria, Trujillo, Peru
[b] Fitogen Program, Department of Aquaculture and Agrifood Resources, Universidad de Los Lagos, Av. Fuchslocher 1305, Osorno, Chile

**Lo novedoso: ÁRBOL DE DECISIONES (Método)**

Qiao, J., Ngadi, M. O., Wang, N., Gariépy, C., & Prasher, S. O. (2007). Pork quality and **marbling** level assessment using a **hyperspectral imaging system**. Journal of Food Engineering, 83(1), 10-16.

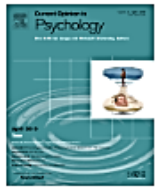
# ¿CÓMO HAGO UN TÍTULO LLAMATIVO?

## Estrategia 3: Redactarlo como pregunta

ELSEVIER

Current Opinion in Psychology

Volume 28, August 2019, Pages 23-27



Mindfulness and sustainability: correlation or causation?

Sonja M Geiger [1] ✉, Paul Grossman [2], Ulf Schrader [1]

[1] Technische Universität Berlin, Institute for Vocational Education and Work Studies, Marchstraße 23, 10587 Berlin, Germany

[2] European Center for Mindfulness, Merzhauser Str. 177, 79100 Freiburg, Germany

Atención plena y sostenibilidad: ¿correlación o causalidad?

https://www.sciencedirect.com/science/article/pii/S2352250X18301556

# ¿CÓMO HAGO UN TÍTULO LLAMATIVO?

## Estrategia 3: Redactarlo como pregunta

Journal of Food Engineering 209 (2017) 61–67

Contents lists available at ScienceDirect

Journal of Food Engineering

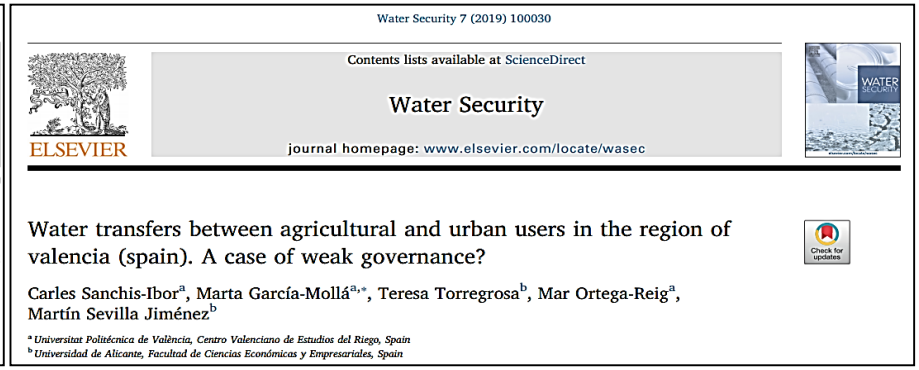
journal homepage: www.elsevier.com/locate/jfoodeng

How does particle size influence caking in lactose powder?

M. Carpin [a, b, c], H. Bertelsen [a], A. Dalberg [a], J.K. Bech [a], J. Risbo [b], P. Schuck [c, *], R. Jeantet [c]

[a] Arla Foods Ingredients Group P/S, 6920 Videbæk, Denmark
[b] Department of Food Science, University of Copenhagen, 1958 Frederiksberg C, Denmark
[c] STLO, UMR 1253, INRA, Agrocampus Ouest, 35000 Rennes, France

¿Cómo influye el tamaño de partícula en el apelmazamiento de lactosa en polvo?



Water Security 7 (2019) 100030

Contents lists available at ScienceDirect

Water Security

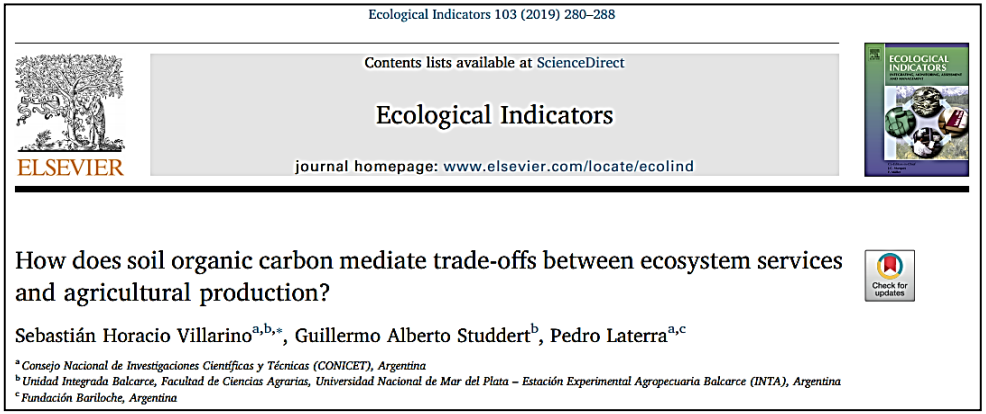
journal homepage: www.elsevier.com/locate/wasec

Water transfers between agricultural and urban users in the region of valencia (spain). A case of weak governance?

Carles Sanchis-Ibor[a], Marta García-Mollá[a,*], Teresa Torregrosa[b], Mar Ortega-Reig[a], Martín Sevilla Jiménez[b]

[a] Universitat Politècnica de València, Centro Valenciano de Estudios del Riego, Spain
[b] Universidad de Alicante, Facultad de Ciencias Económicas y Empresariales, Spain

Transferencias de agua entre usuarios agrícolas y urbanos en la región de Valencia (España). ¿Un caso de gobierno débil?



Ecological Indicators 103 (2019) 280–288

Contents lists available at ScienceDirect

Ecological Indicators

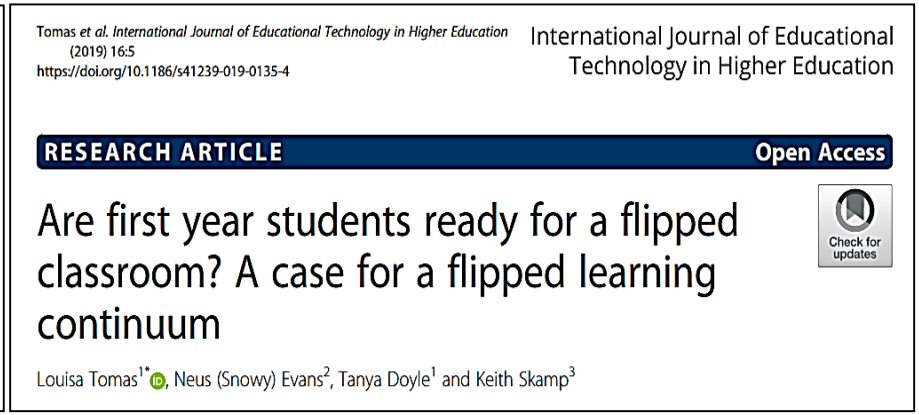
journal homepage: www.elsevier.com/locate/ecolind

How does soil organic carbon mediate trade-offs between ecosystem services and agricultural production?

Sebastián Horacio Villarino[a,b,*], Guillermo Alberto Studdert[b], Pedro Laterra[a,c]

[a] Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina
[b] Unidad Integrada Balcarce, Facultad de Ciencias Agrarias, Universidad Nacional de Mar del Plata – Estación Experimental Agropecuaria Balcarce (INTA), Argentina
[c] Fundación Bariloche, Argentina

¿Cómo el carbono orgánico del suelo media las compensaciones entre los servicios de los ecosistemas y la producción agrícola?



Tomas et al. International Journal of Educational Technology in Higher Education (2019) 16:5
https://doi.org/10.1186/s41239-019-0135-4

International Journal of Educational Technology in Higher Education

RESEARCH ARTICLE Open Access

Are first year students ready for a flipped classroom? A case for a flipped learning continuum

Louisa Tomas[1*], Neus (Snowy) Evans[2], Tanya Doyle[1] and Keith Skamp[3]

¿Los estudiantes de primer año están listos para un aula invertida? Un caso para un continuo de aprendizaje volteado

# ¿CÓMO HAGO UN TÍTULO INFORMATIVO?

Un título informativo posibilita que el lector identifique el tema con facilidad.

**Contenido de un título informativo**

- Variables de estudio (independientes y dependientes)
- Método utilizado (objeto de estudio, técnica, diseño estadístico, etc.)
- Resultado
- Localización del estudio
- Fecha de ejecución del estudio.

**Regla para una publicación de impacto**

Colocar lo más importante, lo que sea de mayor impacto y relevante.

# ¿CÓMO HAGO UN TÍTULO INFORMATIVO?

Incluir las variables de estudio (cuando no son muchas), método y resultado.

J Food Sci Technol (February 2018) 55(2):811–820
https://doi.org/10.1007/s13197-017-3006-9

ORIGINAL ARTICLE

Resultado — Variables — Objeto de estudio

**Optimization of lipid profile and hardness of low-fat mortadella following a sequential strategy of experimental design**

Método

Erick Saldaña[1] · Raúl Siche[2] · Jair Sebastião da Silva Pinto[1] · Marcio Aurélio de Almeida[1] · Miriam Mabel Selani[3] · Juan Rios-Mera[1] · Carmen J. Contreras-Castillo[1]

# ¿CÓMO HAGO UN TÍTULO INFORMATIVO?

Incluir el aspecto temporal sólo cuando sea de impacto

*Systems* **2014**, *2*, 328-365; doi:10.3390/systems2030328

OPEN ACCESS

*systems*

ISSN 2079-8954

www.mdpi.com/journal/systems

*Article*

**Emergy Evaluation of Formal Education in the United States: 1870 to 2011** †

**Daniel E. Campbell [1,*] and Hongfang Lu [2]**

[1] USEPA, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Atlantic Ecology Division, 27 Tarzwell Drive, Narragansett, RI 02882, USA

[2] South China Botanical Garden, Chinese Academy of Sciences, 723 Xingke Rd., Tianhe District, Guangzhou 510650, China; E-Mail: luhf@scbg.ac.cn

# ¿CÓMO HAGO UN TÍTULO INFORMATIVO?

Incluir el aspecto geográfico cuando sea necesario, pero sin ser muy específico


Fig. 1 – Study area. Brazil Country, Sao Paulo State, Amparo County. TL: Três Lagos farm; DC: Duas Cachoeiras farm; SH: Santa Helena farm.

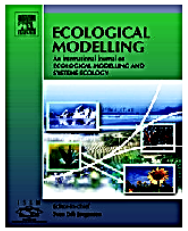
ECOLOGICAL MODELLING 210 (2008) 37–57

available at www.sciencedirect.com

ScienceDirect

ELSEVIER

journal homepage: www.elsevier.com/locate/ecolmodel




## The use of emergy assessment and the Geographical Information System in the diagnosis of small family farms in Brazil

*Feni Agostinho*[a], *Guaraci Diniz*[b], *Raúl Siche*[c], *Enrique Ortega*[a,*]

[a] *FEA (College of Food Engineering) – Unicamp, CP 6121, CEP 13083-862 Campinas, SP, Brazil*
[b] *Sítio Duas Cachoeiras (Farm) – Rodovia SP 360, Km 121, CEP 13908-009 Arcadas, Amparo, SP, Brazil*
[c] *Escuela de Ingeniería Agroindustrial – Facultad de Ciencias Agropecuarias, Universidad National de Trujillo, Av. Juan Pablo II s/n. C. Universitaria, Trujillo, Peru*

# ERRORES


## HAY QUE EVITARLOS

## Errores de concisión

Efecto de expresar el título atinada y exactamente con el menor número de palabras posibles:

✓ Uso innecesario de preposiciones y de artículos

Revista Facultad Nacional de Agronomía

DOI: https://doi.org/10.15446/rfnam.v68n1.47829

Rev.Fac.Nac.Agron., Volumen 68, Número 1, p. 7423-7439, 2015. ISSN electrónico 2248-7026. ISSN impreso 0304-2847.

**Una Estrategia de Innovación en Fertilizantes Orgánicos Mediante Lógica Difusa**

***An Innovation Strategy in Organic Fertilizer by Fuzzy Logic***

**Miguel David Rojas López[1] Juan David Sánchez Uribe[2] y Laura Marcela Londoño Vásquez[3]**

## Errores de concisión

Efecto de expresar el título atinada y exactamente con el menor número de palabras posibles:

✓ Uso innecesario de preposiciones y de artículos

Research article

http://www.revistas.unal.edu.co/index.php/refame

Revista Facultad Nacional de Agronomía

**The effect of storage temperature and time on total phenolics and enzymatic activity of sapodilla (*Achras sapota* L.)**

UNIVERSIDAD NACIONAL DE COLOMBIA

doi: 10.15446/rfna.v69n2.59140

Jairo Mercado Camargo[1*], Arnulfo Taron Dunoyer[2] and Luis A. García-Zapateiro[2]

[1] Facultad de Ciencias Farmacéutica. Universidad de Cartagena. Campus de Ciencias de la Salud, Cartagena, Colombia.
[2] Facultad de Ingeniería. Universidad de Cartagena. Campus de Piedra de Bolívar, Cartagena, Colombia.
* Corresponding author <jmercadoc@unicartagena.edu.co>

Received: March 31, 2016; Accepted: June 13, 2016
Rev.Fac.Nac.Agron. 69(2): 7955-7963. 2016 ISSN 0304-2847 / e-ISSN 2248-7026

## Errores de claridad

- ✓ **Sintaxis incorrecta** (orden equivocado en el uso de las palabras)
- ✓ Uso de las **palabras ambiguas**, vagas (incomprensibles)
- ✓ Uso de **jergas o jerigonzas.**
- ✓ Uso de **abreviaturas, fórmulas químicas, nombres patentados** (en lugar de genéricos)

## Errores de claridad

✓ **Sintaxis incorrecta**

**Sintaxis:** forma como se relacionan las palabras que aparecen en una misma frase o párrafo.

**Por ejemplo:**

Caracterización de bacterias que producen mastitis mediante cromatografía gas-Líquido

**Debería ser:**

Caracterización mediante cromatografía gas-Líquido de bacterias que producen mastitis

## Errores de claridad

✓ Palabras ambiguas, vagas (incomprensibles)

*Rev Soc Quím Perú. 82(2) 2016*

***Recibido el 19-04-2016***
***Aprobado el 01-07-2016***

**INTERACCIONES DEL ÁCIDO DL-2-AMINOBUTÍRICO EN SOLUCIONES ACUOSAS DE NITRATO DE SODIO A VARIAS TEMPERATURAS**

Manuel S. Páez M.*[a], Dairo E. Pérez S.[a], Oscar Julio M.[a]

[a] Facultad de Ciencias Básicas, Departamento de Química, Universidad de Córdoba, Km 3. Vía a Cereté, Carrera 6 Nº 76 - 103. Montería-Córdoba, Colombia, mspaezm@gmail.com

## Errores de claridad

✓ Palabras ambiguas, vagas (incomprensibles)

Revista de Derecho Vol. XXIX - Nº 1 - JUNIO 2016 Páginas 141-159

Algunas precisiones sobre el término anticipado del procedimiento de evaluación ambiental

*Pablo Méndez Ortiz**

* Pablo Méndez Ortiz, Abogado. Licenciado en Derecho, Universidad de Valparaíso. Abogado asociado en Vergara Galindo Correa Abogados. Correo electrónico: pmendez@vgcabogados.cl.

Artículo recibido el 28 de marzo de 2015 y aceptado para su publicación el 21 de enero de 2016.

## Errores de claridad

✓ Evitar **abreviaturas (siglas), fórmulas químicas, nombres patentados**, salvo que sea correcto

LWT - Food Science and Technology 57 (2014) 634–639

Contents lists available at ScienceDirect

LWT - Food Science and Technology

journal homepage: www.elsevier.com/locate/lwt

Acid-induced formation of soy protein gels in the presence of NaCl

Stefan Schuldt, Norbert Raak, Doris Jaros, Harald Rohm*

*Institute of Food Technology and Bioprocess Engineering, Technische Universität Dresden, 01069 Dresden, Germany*

Es posible

## Errores de claridad

✓ Evitar **abreviaturas (siglas), fórmulas químicas, nombres patentados**, salvo que sea correcto

*Materials Research*. 2016; 19(2): 269-275
DOI:http://dx.doi.org/10.1590/1980-5373-MR-2015-0387



**Compound Effect of $CaCO_3$ and $CaSO_4 \cdot 2H_2O$ on the Strength of Steel Slag - Cement Binding Materials**

*Liqian Qi[a], Jiaxiang Liu[a]*, Qian Liu[a]*

*[a]Beijing Key Laboratory of Electrochemical Process and Technology for Materials, The State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing 100029, People's Republic of China*

Received: July 4, 2015; Revised: October 10, 2015; Accepted: November 20, 2015

Aceptable

## Errores de claridad

✓ Evitar **abreviaturas (siglas), fórmulas químicas, nombres patentados**, salvo que sea correcto




AAS®, **Aspirina**®, Calmantina®, Inyesprin®, Rhonal®, Sedergine®

**NOMBRES PATENTADOS**


**NOMBRE GENÉRICO**

## Errores de claridad

✓ Evitar **abreviaturas (siglas), fórmulas químicas, nombres patentados**, salvo que sea correcto

ELSEVIER

Experimental Gerontology

Volume 95, September 2017, Pages 54-62


# Metabolome analysis of effect of aspirin on *Drosophila* lifespan extension

Chaochun Song [1], Chenxing Zhu [1], Qi Wu, Jiancheng Qi, Yue Gao, Zhichao Zhang, Uma Gaur, Deying Yang, Xiaolan Fan, Mingyao Yang

Institute of Animal Genetics and Breeding, Sichuan Agricultural University, Chengdu, Sichuan 611130, PR China

Received 1 January 2017, Revised 28 March 2017, Accepted 27 April 2017, Available online 27 April 2017.

## Errores de claridad

✓ Evitar **abreviaturas (siglas), fórmulas químicas, nombres patentados**, salvo que sea correcto

J. Chem. Thermodynamics 110 (2017) 186–192

Contents lists available at ScienceDirect

J. Chem. Thermodynamics

journal homepage: www.elsevier.com/locate/jct

Solubility of commercial octacosanol in organic solvents and their correlation by thermodynamic models at different temperatures

Maitê S. Cuevas [a,b,*], Eduardo J. Crevelin [c], Luiz A.B. de Moraes [c], Alessandra L. Oliveira [d], Christianne E.C. Rodrigues [b,*], Antonio J.A. Meirelles [a]

[a] Laboratory of Extraction, Applied Thermodynamics and Equilibrium (EXTRAE), University of Campinas, 13083-862 Campinas, Brazil
[b] Separation Engineering Laboratory (LES), University of São Paulo, P.O. Box 23, 13635-900 Pirassununga, Brazil
[c] Mass Spectrometry Laboratory, University of São Paulo, 14040-901, Ribeirão Preto, Brazil
[d] Natural Products and High Pressure Technology Laboratory (LTAPPN), University of São Paulo, P.O. Box 23, 13635-900 Pirassununga, Brazil

## Errores de sobreexplicación

Declaración o exposición repetitiva e inútil de un concepto

Ejemplos más frecuentes:

- Estudio sobre .....
- Informe de ....
- Investigación acerca de ...
- Contribución a ....
- Resultados de un estudio sobre ...
- Análisis de (del) ...
- Obtención de …

## Errores de sobreexplicación

Declaración o exposición repetitiva e inútil de un concepto

ELSEVIER

The Journal of Social Studies Research

Volume 40, Issue 4, October 2016, Pages 263-279

# A study of state social studies coordinators' views of the Common Core

Kathy Swan [a], John Lee [b], S.G. Grant [c]

[a] Social Studies Education, 343 Dickey Hall, University of Kentucky, Lexington, KY 40506, USA

[b] Social Studies Education, 402D Poe Hall, North Carolina State University, USA

[c] Social Studies Education, AB-133, Graduate School of Education, Binghamton University, Binghamton, NY 13902, USA

## Errores de sobreexplicación

Declaración o exposición repetitiva e inútil de un concepto

Revista Cubana de Farmacia. 2015;49(2):254-270

ARTÍCULO ORIGINAL

**Evaluación del efecto antitumoral del nimotuzumab combinado con radioquimioterapia en tumores de esófago**

**Evaluation of the antitumor effect of nimotuzumab combined with radiochemotherapy in treatment of esophageal tumors**

**MSc. Lilia Saborido Martín,[I] Dr. C. Jorge Luis Soriano García,[II] MSc. Sandra Álvarez Guerra,[I] MSc. Zoe González Hernández,[I] MSc. Ibis Riquelme Abreu[I]**

[I] Centro Nacional Coordinador de Ensayos Clínicos. La Habana, Cuba.
[II] Hospital Hermanos Ameijeiras. La Habana, Cuba.

## Errores de sobreexplicación

Declaración o exposición repetitiva e inútil de un concepto

Rev. Interam. Bibliot. Medellín (Colombia) Vol. 38, número 2/mayo-agosto 2015 pp. 159-164 ISSN 0120-0976

# Los museos de Cataluña en las redes sociales: resultados de un estudio de investigación[1]

**Cómo citar este artículo**: Badell, J.-I. (2015). Los museos de Cataluña en las redes sociales: resultados de un estudio de investigación. *Revista Interamericana de Bibliotecología*, *38*(2), 159-164. doi: 10.17533/udea.rib.v38n2a07

**Recibido**: 24/04/2014 / **Aceptado**: 14/10/2014

***Joan-Isidre Badell***
*Doctorando en la Universidad de Barcelona. Profesor en IDEC-Universidad Pompeu Fabra (Barcelona) e investigador Grupo DigiDoc (Documentación Digital) de la Universidad Pompeu Fabra, así como bibliotecario especializado en humanidades en la misma universidad.jibadell@gmail.com*

1. Este artículo muestra los resultados del proyecto Los museos catalanes en la web 2.0: análisis de la difusión de sus fondos y actividades en las redes sociales, del programa de Doctorado en Información y Documentación en la Sociedad del Conocimiento de la Universidad de Barcelona, Facultad de Biblioteconomía y Documentación. Los directores y tutores del proyecto de investigación son el Dr. Miquel Térmens de la Universidad de Barcelona y el Dr. Cristòfol Rovira de la Universidad Pompeu Fabra de Barcelona.

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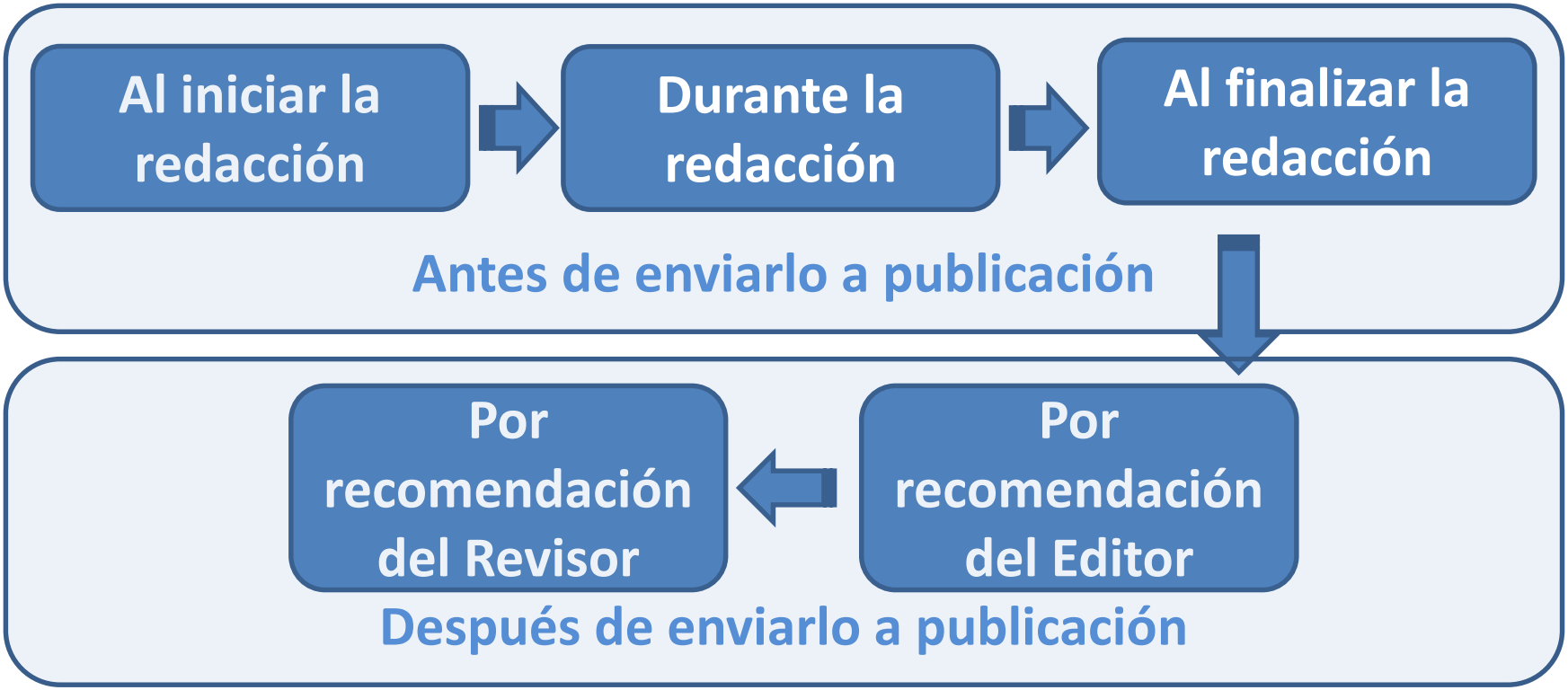


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# 10 preguntas en la redacción de un artículo científico (AC)

Importancia de publicar un AC

1. **¿Cómo redactar un buen título?**
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9. **¿A quién agradecer en un AC?**
10. **¿Qué estilo utilizar para redactar las referencias bibliográficas?**

El camino de un AC hasta su publicación

# ¿QUIÉN O QUIENES SON AUTORES?

Ecological Indicators 10 (2010) 475–483

Contents lists available at ScienceDirect

Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind

## Emergy Net Primary Production (ENPP) as basis for calculation of Ecological Footprint

Raúl Siche [a,*], Feni Agostinho [b], Enrique Ortega [b]

[a] Escuela de Ingeniería Agroindustrial – Facultad de Ciencias Agropecuarias, Universidad, Nacional de Trujillo, Av. Juan Pablo II s/n, C. Universitaria, Trujillo, Peru
[b] Ecological Engineering Laboratory, Food Eng. School, State University of Campinas, (Unicamp) Cx. Postal 6121, CEP 13083-862, Campinas, SP, Brasil

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ABSTRACT

Society needs urgently good tools to understand the biosphere dynamics, become aware of Earth's biophysical limits and make appraisals of environmental performance of human dominated systems. In this context, the Ecological Footprint (EF) was suggested as one of the most important tools. But, according to calculations based on Emergy Analysis, the indicators of EF could underestimate the problem of human carrying support. EF does not consider the work of untouched nature in productivity and ecosystems services. In order to improve the EF results, the present study suggests: (a) to include the ecosystems not considered in conventional EF i.e. tundra, deserts and areas covered by ice; (b) to consider the value of Net Primary Production (NPP) in Emergy units (sej $m^{-2}$ $year^{-1}$) as the base for the calculation of Equivalent Factors (EQF); (c) to account for the consumption of fossil energy used in collection, treatment and distribution of water for domestic use, for this the carbon emissions data (in tonC $m^{-3}$ of water) were used. Introducing these changes to the conventional EF calculation and considering the Peruvian economy (in 2004) as the study case, the Biocapacity obtained was 14.31 gha $capita^{-1}$ and the footprint was 6.68 gha $capita^{-1}$. These values mean that Peru can support 2.14 times its population if the current life style is maintained, as opposed to the 4.0 times ratio obtained with a conventional EF calculation.



### 1. Introduction

The Ecological Footprint (EF) is a tool that is being used by the world-wide scientific community, as a result of its didactic form to transmit the impact of the society on nature through easy-to-understand measurement. There are two main reasons for which the EF has become very popular: it uses a mathematical formula to consider the effect of the consumption of society (Footprint) in its natural environmental (Biocapacity); and it incorporates a vast amount of information in a simple quantitative measure to express its results (land area in global hectares). The EF calculates Biocapacity as the availability in bioproductive land area and footprint as the consumption of the evaluated system, both in global hectares. Details of the calculations can be obtained in Monfreda et al. (2004).

As with the majority of the existing methods that evaluate the sustainability of systems and processes, the EF-GAEZ (called thus because it uses the Global model Agro-Ecological Zones of FAO) has been extensively criticized. Main inadequacies of the EF-GAEZ ability to measure the level of human impact are:

(a) It considers carbon emissions as area of forest necessary to absorb $CO_2$, but some carbon sequestering also occurs in areas of agriculture, pasture, ocean, and so on (Venetoulis and Talberth, 2008). Even though these areas absorb $CO_2$ to a lesser extend than forests, they need to be accounted for. Areas considered non-productive or with low productivity (mountains, deserts, tundra, and areas covered by ice) are not considered in EF-GAEZ (Venetoulis and Talberth, 2008), but they produce environmental services that must be accounted for in the Biocapacity. Nevertheless, the EF-GAEZ makes conservative estimates when sufficient data are not available.
(b) EF-GAEZ considers each area only once, although the same area may be supplying two or more ecological services. Only the forest areas are counted two times, one as bioproductive area to supply forest products and another as available area to absorb $CO_2$ emissions (Monfreda et al., 2004). Even so, the

Abbreviations: BC, Biocapacity; EF, Ecological Footprint; EF-GAEZ, EF based on GAEZ suitability indices; EF-NPP, EF approach that employs Net Primary Production; EF-ENPP, EF approach that employs Net Primary Production based on Emergy; EMA, Emergy Analysis; ENPP, Emergy Net Primary Production; EQF, Equivalence Factor; YF, Yield Factor; GAEZ, Global Agricultural Ecological Zone; GAP, Global Average Productivity; GDP, Gross Domestic Product; gha, global hectare (in this work gha means Peru's hectare); GtC, $10^9$ ton of carbon; LCF, Load Capacity Factor; NPP, Net Primary Production; CCW, Continental and Glacial Water; REN, Renewability; sej, solar emjoules (unit measure of Emergy Analysis); Tr, solar Transformity.

* Corresponding author. Tel.: +51 44 294778; fax: +51 44 294778.
*E-mail address:* raulsiche@unitru.edu.pe (R. Siche).

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- ✓ Su **contribución esencial** a la concepción y diseño del estudio, a la adquisición de datos o el análisis y la interpretación de estos;
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- ✓ La **aprobación final** de la versión que será publicada.

# AUTORES: ¿CUÁL ES EL ORDEN?

International Journal of Biological Macromolecules 125 (2019) 800–807

Contents lists available at ScienceDirect

International Journal of Biological Macromolecules

journal homepage: http://www.elsevier.com/locate/ijbiomac


## Biodegradable foam tray based on starches isolated from different Peruvian species

J.P. Cruz-Tirado [a], Ricardo Vejarano [b], Delia R. Tapia-Blácido [c], Gabriela Barraza-Jáuregui [a], Raúl Siche [a,*]

[a] Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, Trujillo, Peru
[b] Facultad de Ingeniería, Universidad Privada del Norte (UPN), Av. Del Ejército 920, Trujillo, Peru
[c] Departamento de Química, Faculdade de Filosofia, Ciências e Letras, Universidade de São Paulo, Av. Bandeirantes, 3900, CEP 14040-901 Ribeirão Preto, SP, Brazil

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# AUTOR CORRESPONDIENTE

Food Control 101 (2019) 45–52

Contents lists available at ScienceDirect

Food Control

journal homepage: www.elsevier.com/locate/foodcont

Hyperspectral imaging as a powerful tool for identification of papaya seeds in black pepper

Imer Orrillo[a,1], J.P. Cruz-Tirado[b,1], Alicia Cardenas[a], Maritza Oruna[a], Alessandra Carnero[a], Douglas F. Barbin[b], Raúl Siche[a,*]

[a] Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, Trujillo, Peru
[b] Department of Food Engineering, University of Campinas, Brazil

* Corresponding author.
E-mail address: rsiche@unitru.edu.pe (R. Siche).
[1] These authors contributed equal work to this paper.

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# AUTOR: ¿COMO REDACTARLO?

Meat Science 140 (2018) 44–50

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci

Descriptive analysis of bacon smoked with Brazilian woods from reforestation: methodological aspects, statistical analysis, and study of sensory characteristics

Erick Saldaña[a], Luiz Saldarriaga Castillo[b], Jorge Cabrera Sánchez[b], Raúl Siche[b], Marcio Aurélio de Almeida[a], Jorge H. Behrens[c], Miriam Mabel Selani[d], Carmen J. Contreras-Castillo[a,*]

[a] Universidade de São Paulo (USP), Escola Superior de Agricultura "Luiz de Queiroz" (ESALQ), Departamento de Agroindústria, Alimentos e Nutrição (LAN), Piracicaba, SP 13418-900, Brazil
[b] Universidad Nacional de Trujillo, Facultad de Ciencias Agropecuarias, Av. Juan Pablo II s/n. Ciudad Universitaria, Trujillo, Peru
[c] Department of Food and Nutrition, School of Food Engineering, University of Campinas, Rua Monteiro Lobato, 80, Campinas, SP 13083-862, Brazil
[d] Universidade Federal de São Carlos - Campus Lagoa do Sino, Centro de Ciências da Natureza, Buri, SP, Brazil

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El camino de un AC hasta su publicación

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ECOLOGICAL MODELLING 210 (2008) 37–57

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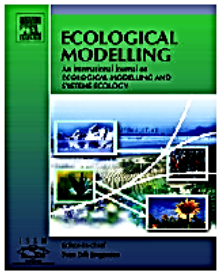


## The use of emergy assessment and the Geographical Information System in the diagnosis of small family farms in Brazil

*Feni Agostinho*[a], *Guaraci Diniz*[b], *Raúl Siche*[c], *Enrique Ortega*[a,*]

[a] FEA (College of Food Engineering) – Unicamp, CP 6121, CEP 13083-862 Campinas, SP, Brazil
[b] Sítio Duas Cachoeiras (Farm) – Rodovia SP 360, Km 121, CEP 13908-009 Arcadas, Amparo, SP, Brazil
[c] Escuela de Ingeniería Agroindustrial – Facultad de Ciencias Agropecuarias, Universidad National de Trujillo, Av. Juan Pablo II s/n. C. Universitaria, Trujillo, Peru

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Food Bioscience 17 (2017) 24–28

Contents lists available at ScienceDirect

Food Bioscience

journal homepage: www.elsevier.com/locate/fbio

## Osmotic pretreatment to assure retention of phenolics and anthocyanins in berry jams

Gabriela Barraza-Jáuregui[a,b,*], G. Vega[a], J. Valeriano[a], J. Obregón[c], Raúl Siche[a], A.C. Miano[d]

[a] Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias,, Universidad Nacional de Trujillo, Trujillo, Peru
[b] Escuela de Ingeniería de Industrias Alimentarias, Facultad de Ciencias Agrarias, Universidad Antenor Orrego, Trujillo, Peru
[c] Quality Management Consultant, Engineering Consulting & Services, Trujillo, Peru
[d] Department of Agri-food Agri food Industry, Food and Nutrition (LAN), Luiz de Queiroz College of Agriculture (ESALQ), University of São Paulo (USP), Piracicaba, SP, Brazil

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Food Research International 89 (2016) 701–708

Contents lists available at ScienceDirect

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ELSEVIER

Ultrasound pre-treatment enhances the carrot drying and rehydration

CrossMark

Cinthia Ricce [a,b], Meliza Lindsay Rojas [a], Alberto Claudio Miano [a], Raul Siche [b], Pedro Esteves Duarte Augusto [a,*]

[a] Department of Agri-food Industry, Food and Nutrition (LAN), Luiz de Queiroz College of Agriculture (ESALQ), University of São Paulo (USP), Piracicaba, SP, Brazil
[b] Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Trujillo, LL, Perú

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Ecological Indicators 10 (2010) 475–483

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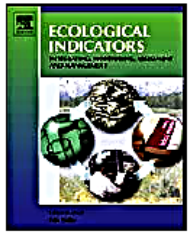


## Emergy Net Primary Production (ENPP) as basis for calculation of Ecological Footprint

Raúl Siche [a,*], Feni Agostinho [b], Enrique Ortega [b]

[a] Escuela de Ingeniería Agroindustrial – Facultad de Ciencias Agropecuarias, Universidad, Nacional de Trujillo, Av. Juan Pablo II s/n, C. Universitaria, Trujillo, Peru
[b] Ecological Engineering Laboratory, Food Eng. School, State University of Campinas, (Unicamp), Cx. Postal 6121, CEP 13083-862, Campinas, SP, Brazil

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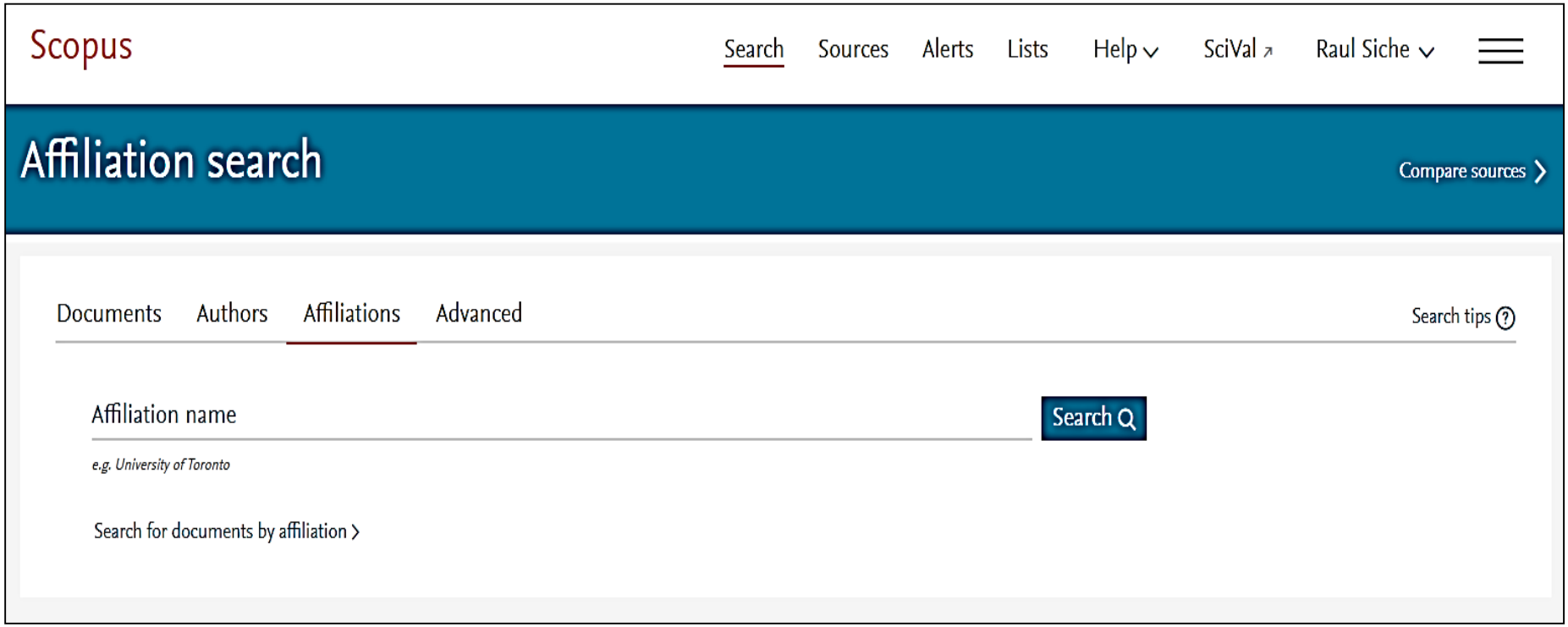

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El camino de un AC hasta su publicación

# RESUMEN (ABSTRACT)

El resumen consiste básicamente en la reducción a términos breves y concisos de lo esencial de un asunto o materia.

**Cómo resumir**

- ✓ Leer el texto tantas veces como sea necesario.
- ✓ Pensar en el texto e "integrarnos" a él, hasta estar seguros de haberlo comprendido.
- ✓ Discernir la importancia de cada elemento que figura en el texto.
- ✓ Elegir qué elementos debemos sacrificar y cuáles destacar.
- ✓ Por último expresar con nuestras propias palabras lo que hemos comprendido.

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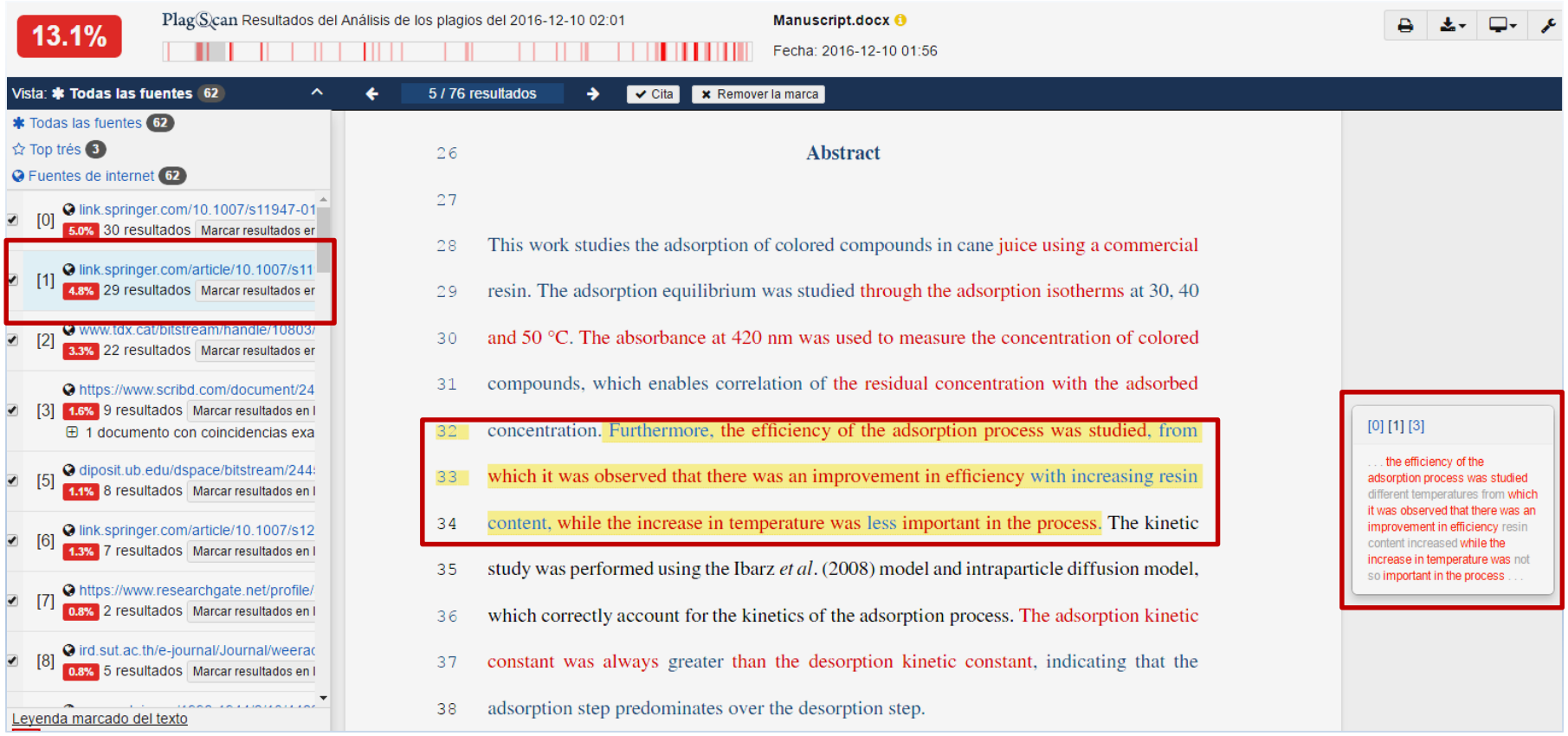

# RESUMEN (ABSTRACT)

El resumen consiste básicamente en la reducción a términos breves y concisos de lo esencial de un asunto o materia.

**Errores más frecuentes**

- ✓ No presenta un orden adecuado
- ✓ Ser demasiado extenso (más de 200 palabras)
- ✓ Incluir información innecesaria.
- ✓ El Abstract (traducción al inglés del resumen) no se traduce correctamente.

Información innecesaria

**Resumen**

El presente estudio corresponde a un diseño no experimental, de tipo analítico con casos y controles con el objetivo de identificar los factores asociados a la inasistencia al control prenatal, en gestantes atendidas en un puesto de salud de Tumbes. La muestra estuvo representada por 41 casos y 41 controles. Los instrumentos fueron validados mediante una prueba piloto y sometidos al análisis de fiabilidad con el coeficiente alfa de Cronbach. Los datos se analizaron haciendo uso de la prueba estadística de Chi cuadrado y el Odds Ratio (OR). Se concluye que la inasistencia al control prenatal se asocia a factores biológicos como la edad gestacional al primer control prenatal; a factores sociales: el embarazo no deseado y dificultad para realizar quehaceres domésticos; a factores culturales: violencia familiar y olvido de citas y a factores institucionales: atención insatisfactoria; falta de seguimiento; tiempo de espera largo y servicios incompletos.

# RESUMEN (ABSTRACT)

## Artículo de Investigación Original

LWT - Food Science and Technology xxx (2014) 1–7

Contents lists available at ScienceDirect

LWT - Food Science and Technology

journal homepage: www.elsevier.com/locate/lwt

### Measurement parameter of color on yacon (*Smallanthus sonchifolius*) slices using a computer vision system

Erick Saldaña [a], Raúl Siche [b, *], Wilson Castro [c], Rosmer Huamán [d], Roberto Quevedo [e]

[a] Department of Agro-industry, Food and Nutrition, "Luiz de Queiroz" Agricultural College, University of Sao Paulo, Piracicaba City, SP 13418-900, Brazil
[b] Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n. Ciudad Universitaria, Trujillo, Peru
[c] Facultad de Ingeniería y Ciencias Agrarias, Universidad Nacional Toribio Rodríguez de Mendoza de Amazonas, Pampas de Higos Urco S/N, Ciudad Universitaria, Amazonas, Peru
[d] Escola de Química e Alimentos, Universidade Federal de Rio Grande, Av. Italia km 8, Campos Carreiros s/n. Rio Grande, Brazil
[e] Food Science and Technology Department, Universidad de Los Lagos, Osorno, Chile

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Minimally processed food
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Yacon

ABSTRACT

The aim of this research was to design, implement and calibrate a Computer Vision System (CVS) in real-time, in order to measure the color on minimally processed yacon slices. For this purpose a (software and hardware) was designed and implemented which consisted of two steps: a) image acquisition and b) image processing and analysis. For both, an algorithm and a graphical user interface (GUI) were developed in MatLab. CVS calibration was performed with a conventional colorimeter (Model CIE $L^*a^*b^*$). Minimally processed yacon slices were obtained and stored at 5 °C. Color changes were estimated every 2 h for 26 h, obtaining its color parameters. $L^*$ decreased from 65.9 to 60.8, with a tendency to a black color, $a^*$ increased from 7.3 to 17.7, approaching a red color, $b^*$ increased from 33.1 to 41.5, presenting a tendency to a yellow color. Moreover, $C^*$ increased from 35.9 to 48.1, $H^*$ decreased from 78.2 to 66.9 and $\Delta E^*$ increased from 2.6 to 13.2. Low errors calculated ($e_{L^*}$ = 5.001%, and $e_{a^*}$ = 2.287%, and $e_{b^*}$ = 4.314%) ensure suitable and efficient application in industrial process automation and quality control in the food industry.



Objetivo

Metodología

Resultados y Conclusiones

# RESUMEN (ABSTRACT)

INTERNATIONAL JOURNAL OF FOOD PROPERTIES
2017, VOL. 20, NO. S2, S1264–S1297
https://doi.org/10.1080/10942912.2017.1338729

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Artículo de Revisión



## Evaluation of biological contaminants in foods by hyperspectral imaging: A review

Ricardo Vejarano[a,b], Raúl Siche [a], and Wendu Tesfaye[c]

[a]Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo (UNT), Ciudad Universitaria, Trujillo, Peru; [b]Facultad de Ingeniería, Universidad Privada del Norte (UPN), Trujillo, Peru; [c]Departamento de Química y Tecnología de Alimentos, Universidad Politécnica de Madrid (UPM), Madrid, Spain

**ABSTRACT**

Responding to the ever-growing concern about safe foods and security, the food industries are forced to seek an emerging technology capable of detecting and quantifying contaminations, especially those of biological origin. Among the different emerging technologies, hyperspectral imaging is considered a good alternative as it can be easily applied at all steps of the food production process and is a non-destructive technique. This paper reviews targeted analytical applications of hyperspectral imaging in monitoring biological contaminants in food. First, traditional techniques for detection of biological contaminants in foods are presented, where disadvantages for practical applications are highlighted and explained in detail. Second, prominent applications of hyperspectral imaging from the last decade to food safety and quality assessment are reviewed, specifically focusing on both deteriorative and pathogenic microorganisms, microbial toxins, and parasites; whether acting individually or collectively in spoiling food products and/or represent a health risk to the consumers. Finally, relevant current and future challenges, advantages and disadvantages of hyperspectral imaging applications are briefly examined.

**ARTICLE HISTORY**
Received 16 January 2017
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**KEYWORDS**
Hyperspectral imaging; Microbial contaminants; Toxins detection; Parasite detection; Image technology

Justificación

Objetivo

Opcional

Resumen de los capítulos

# RESUMEN (ABSTRACT)

Food Research International 119 (2019) 839–849

Contents lists available at ScienceDirect

Food Research International

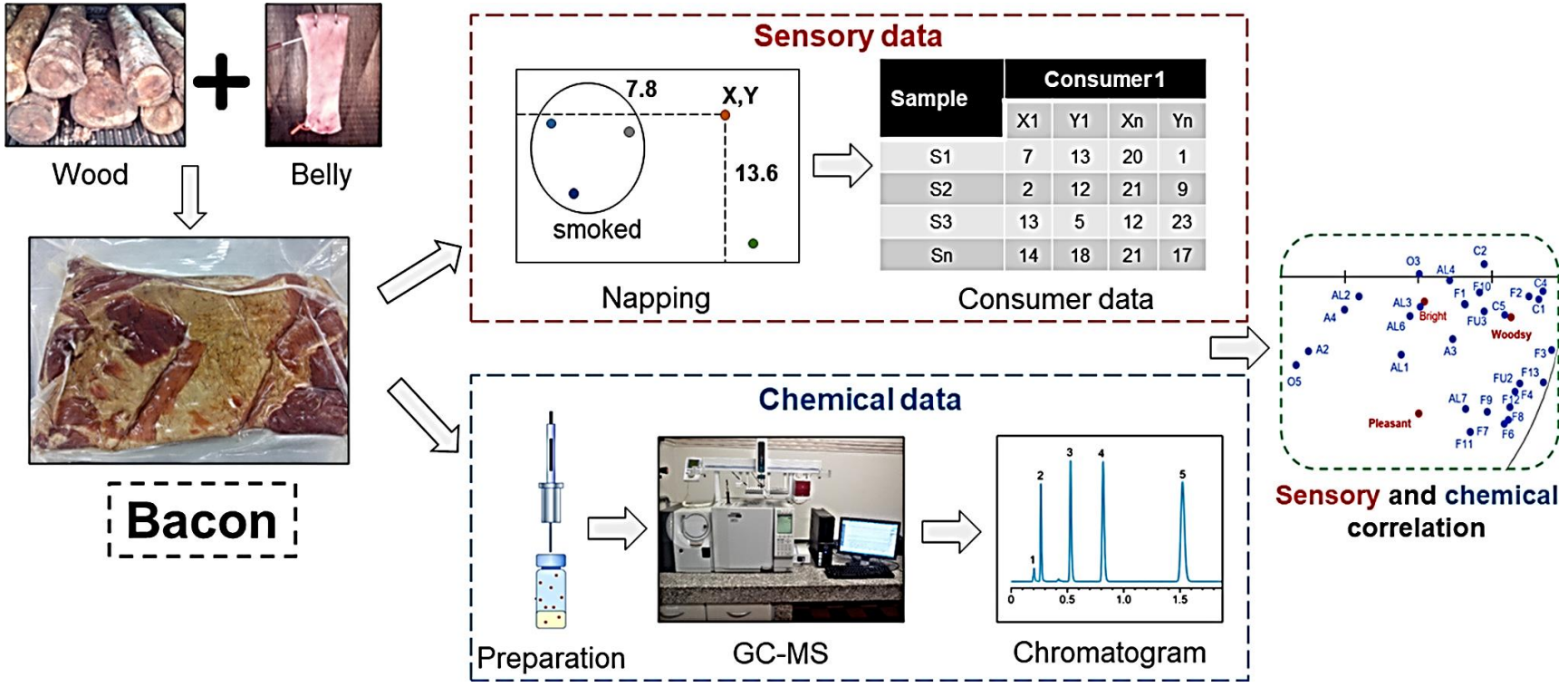
journal homepage: www.elsevier.com/locate/foodres

## Graphical Abstract

Relationship between volatile compounds and consumer-based sensory characteristics of bacon smoked with different Brazilian woods

Erick Saldaña[a], Luiz Saldarriaga[b], Jorge Cabrera[b], Raúl Siche[b], Jorge H. Behrens[c], Miriam M. Selani[d], Marcio A. de Almeida[a], Luciana Duque Silva[e], Jair S. Silva Pinto[a], Carmen J. Contreras-Castillo[a,*]

[a] Escola Superior de Agricultura "Luiz de Queiroz" (ESALQ), Departamento de Agroindústria, Alimentos e Nutrição (LAN), Universidade de São Paulo (USP), Piracicaba 13418-900, Brazil
[b] Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n. Ciudad Universitaria, Trujillo, Peru
[c] Department of Food and Nutrition, School of Food Engineering, University of Campinas, Rua Monteiro Lobato, 80, Campinas 13083-862, Brazil
[d] Centro de Ciências da Natureza, Universidade Federal de São Carlos, Campus Lagoa do Sino Rod. Lauri Simões de Barros, Km 12, Buri, Brazil
[e] Departamento de Ciências Florestais (CF), Escola Superior de Agricultura "Luiz de Queiroz" (ESALQ), Universidade de São Paulo (USP), Piracicaba 13418-900, Brazil



# Palabras clave

# PALABRAS CLAVE

Las palabras clave son términos o frases cortas (lexemas) que permiten **clasificar y direccionar** las entradas en los sistemas de indexación y de recuperación de la información en las bases de
datos de un manuscrito o área temática en particular.
Las palabras clave se convierten entonces en una herramienta esencial de **doble vía**, es decir, de quienes escriben y de quienes buscan la información de manuscritos o áreas temáticas relacionadas.

**En consecuencia, no se debe subvalorar o menospreciar su importancia a la hora de considerarlas, pues se podría dificultar la difusión de un manuscrito e incluso no detectar la relación del mismo con otros similares, justamente por el uso inadecuado de las palabras clave.**

# PALABRAS CLAVE

Así, se considera que las palabras clave (descriptores) incrementan ostensiblemente las posibilidades de profundización y búsqueda de la información de un área temática, lo que no es posible solo a través del examen del título del manuscrito.

**RECOMENDACIÓN**

**Procurar incluir palabras clave que no estén incluidas en el título del manuscrito ni en el resumen, ya que aplicando esta estrategia se pueden aumentar las posibilidades de búsqueda y ser visibles en los sistemas de información actuales.**

# PALABRAS CLAVE

Food Control 101 (2019) 45–52

Contents lists available at ScienceDirect

Food Control

journal homepage: www.elsevier.com/locate/foodcont

## Hyperspectral imaging as a powerful tool for identification of papaya seeds in black pepper

Imer Orrillo[a,1], J.P. Cruz-Tirado[b,1], Alicia Cardenas[a], Maritza Oruna[a], Alessandra Carnero[a], Douglas F. Barbin[b], Raúl Siche[a,*]

[a] Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, Trujillo, Peru
[b] Department of Food Engineering, University of Campinas, Brazil

ARTICLE INFO

*Keywords:*
Black pepper
Hyperspectral images
Near infrared spectroscopy
Food fraud
Spices

ABSTRACT

Food fraud generates great economic losses for the industry and causes distrust in the consumer and traders. Black pepper is one of the most valued spices in the world, being susceptible to economically motivated adulteration. The objective of this study was to investigate the potential of near infrared hyperspectral imaging (NIR-HSI) combined with multivariate analysis to identify black pepper adulterated with common adulterant papaya seeds. Classification models based on principal component analyses (PCA) and soft independent modelling of class analogy (SIMCA) achieved 100% accuracy for classification of berry samples and sensitivity higher than 90% for ground samples. Partial least squares regression (PLSR) preprocessed by SNV + 2nd derivate presented the best prediction capability. A multispectral model using only 7 wavelengths presented RMSEP = 3.65% and RPD = 2.61. The adulteration maps show the distribution of ground papaya seeds in black pepper, which suggests NIR-HSI as a reliable analytical method for prediction of black pepper adulteration. This study demonstrates that NIR-HSI is a potential non-invasive and non-destructive technique to identify authentic black pepper and samples adulterated with papaya seeds.

# PALABRAS CLAVE

**Recomendaciones:**

**- Utilizar el máximo de palabras clave que la revista indica.**

**- Traducir bien las palabras clave (Keywords).**

# 10 preguntas en la redacción de un artículo científico (AC)

Importancia de publicar un AC

1. **¿Cómo redactar un buen título?**
2. **¿Quiénes deben ser autores de una publicación?**
3. **¿Porqué la afiliación es importante?**
4. **¿Cómo redactar un resumen?**
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7. **¿Cómo discutir los resultados?**
8. **¿Cómo concluir en un AC?**
9. **¿A quién agradecer en un AC?**
10. **¿Qué estilo utilizar para redactar las referencias bibliográficas?**

El camino de un AC hasta su publicación

## Artículo de Investigación Original

**Debe proveer:**

**INFORMACIÓN SUFICIENTE**

**Para que el lector entienda:**

- La **realidad problemática (Problema)**
- Las **soluciones reportadas en la literatura científica** relacionados al problema **(Antecedentes)**
- El **vacío en el conocimiento** del asunto que se propone dilucidar **(Justificación teórica)**
- El propósito del estudio **(Objetivo)**.

## Artículo de Revisión

**Debe proveer:**

**INFORMACIÓN SUFICIENTE**

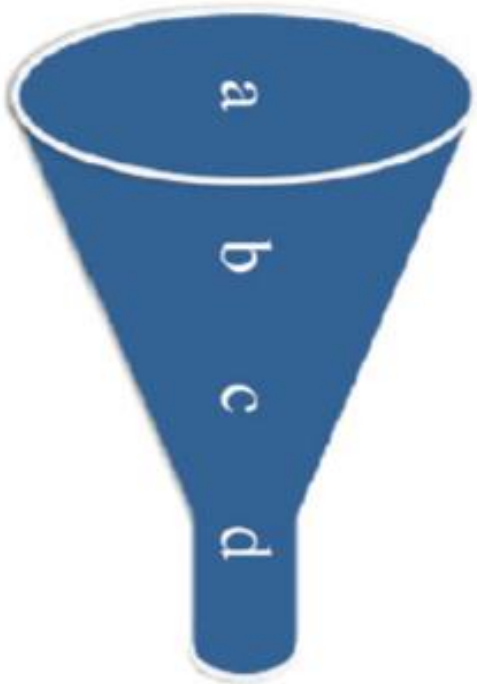
**Para que el lector entienda:**

- La **realidad problemática (Problema)**
- Las **publicaciones reportadas en la literatura científica** relacionados al problema **(Estado del arte), en resumen.**
- El **vacío en el estado del arte (Justificación)**
- El propósito de la revisión **(Objetivo)**.

Opcional

**Es más corto**

## 3. Redacción




**Aspectos generales**

**Aspectos particulares**

# LA INTRODUCCIÓN

## Lo conocido

- Problema
- Antecedentes

Meat Science 133 (2017) 43–50

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci

An application based on the decision tree to classify the marbling of beef by hyperspectral imaging

Lía Velásquez[a], J.P. Cruz-Tirado[a], Raúl Siche[a,*], Roberto Quevedo[b]

[a] Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, Ciudad Universitaria, Trujillo, Peru
[b] Fitogen Program, Department of Aquaculture and Agrifood Resources, Universidad de Los Lagos, Av. Fuchslocher 1305, Osorno, Chile

**Artículo de Investigación Original**

### 1. Introduction

Quality is the key factor for the commercial success of any agricultural food product (Saldaña et al., 2013; Siche et al., 2015; Wu & Sun, 2013a), especially in meat for its importance in the diet as a contributor of protein, vitamins and minerals. The meat is rapidly deteriored by physical and biological agents, which forces the meat processing industry to have rigorous controls to determine its suitability as fresh or stored food (ElMasry, Sun, & Allen, 2013; Lohumi et al., 2016; McAfee et al., 2010). The methods used to evaluate and control meat quality are usually tedious, time-consuming, and destructive, which produces losses to the industry (Xiong, Sun, Zeng, & Xie, 2014).

Marbling is one of the features that most influences the sensory acceptability of meat and meat products (Morales, Guerrero, Aguiar, Guàrdia, & Gou, 2013; Muñoz, Rubio-Celorio, Garcia-Gil, Guàrdia, & Fulladosa, 2015) and it is defined as the amount and spatial distribution of visible fat, which appears as thin spots in the muscle that give a similar appearance to marble (Cernadas, Durán, & Antequera, 2002). Marbling is usually associated with superior quality meat products when the streaks of fat are uniformly distributed over its surface (Xiong et al., 2014). The differences in eating quality can be attributed to the quantitative and spatial distribution of streaks in meat (Albrecht, Wegner, & Ender, 1996) and meat products such as ham, where marbling is used to characterize and classify this product (Cernadas et al., 2002).

The estimated degree of marbling is based on official standards in each country, the American and Japanese standards being the most widespread ones (Liu, Ngadi, Prasher, & Gariépy, 2012). However, as this is conducted by human inspectors, evaluation is subjective and the consistency of its results cannot be guaranteed, leading to various investigations using artificial vision systems for an objective assessment of marbling in beef (Shiranita, Hayashi, Otsubo, Tsuneharu, & Takiyama, 2000; Tan, 2004; Toraichi et al., 2002; Yoshikawa et al., 2000), pork (Faucitano, Huff, Teuscher, Gariepy, & Wegner, 2005; Liu et al., 2012), cured ham (Muñoz et al., 2015) and sheep meat (Przybylak et al., 2016).

Hyperspectral imaging integrates spectroscopy and computer vision techniques to provide both spectral and spatial information of an object (Kamruzzaman, Makino, & Oshita, 2016b; Wu & Sun, 2013b). The spatial information allows the characterization of a complex heterogeneous sample, while that the spectral information allows to identify a wide range of multi-constituent surface and subsurface features (Gowen, O'Donnell, Cullen, Downey, & Frias, 2007). Hyperspectral imaging captures hundreds of images of a single band at a certain wavelength, forming a three-dimensional data structure of multivariate images (hypercube), constituted by a spectrum for each pixel in the image (Kamruzzaman et al., 2016b). The application of hyperspectral imaging technique has proven to be fast and objective. It has been accepted as one of the most powerful methods of nondestructive imaging to predict quality and safety attributes in different species of meat (Kamruzzaman

# LA INTRODUCCIÓN

et al., 2016b; Xiong et al., 2014). Recent researches have used hyperspectral imaging systems for the evaluation of marbling in meat, obtaining good results (Li, Shan, Peng, & Gao, 2011; Liu et al., 2012; Qiao, Ngadi, Wang, Gariépy, & Prasher, 2007). The work of Qiao et al. (2007) stands out because they used marbling standards for objective assessment of marbling scores. Liu et al. (2012) developed an automatic and objective method for the evaluation of degree of marbling in pork based on the simplification of fats to linear patterns areas by image analysis in RGB (Red, Green, Blue) format.

Statistical analysis of the spectra obtained is the most relevant part in the development of hyperspectral imaging methods. So, various statistical methods were used to classify foods or determine certain compounds of interest using hyperspectral imaging, such as Principal Component Analysis (PCA) (Zhang et al., 2016), partial least-squares regression (PLSR) (Lim et al., 2016; Yeh et al., 2016), least square support vector machine (LS-SVM) (Huang, Tang, Yang, & Zhu, 2016; Kamruzzaman, Makino, & Oshita, 2016a; Kamruzzaman et al., 2016b), artificial neural network (ANN) (Khulal, Zhao, Hu, & Chen, 2016), and multilayer perceptron with scaled conjugate gradient (MLP-SCG) (Sanz et al., 2016), among other methods.

The decision tree is one of the most powerful and popular classifiers available, and since it follows a diagram of flow similar to human logic and reasoning, it has the effective ability to learn and understand (Ma, Desterckе, & Wang, 2016; Sok, Ooi, Kuang, & Demidenko, 2016; Wickramarachchi, Robertson, Reale, Price, & Brown, 2016). That compressibility trait, makes the decision trees highly accessible to different users in different areas of learning, which can be found in a wide range of applications such as business (Creamer & Freund, 2010), manufacturing (Ooi, Sok, Kuang, Demidenko, & Chan, 2013; Williams et al., 2016), computational biology (Kingsford & Salzberg, 2008), bioinformatics (He, Hu, Harrison, Tai, & Pan, 2006), geography (Basse, Charif, & Bódis, 2016; Gharaei-Manesh, Fathzadeh, & Taghizadeh-Mehrjardi, 2016), foods (Bozkir & Sezer, 2011; Zwietering, 2015), etc. However, investigations that use decision trees for classifying food products were not found.

This study aimed to develop a rapid and nondestructive system to classify the degree of marbling in beef, based on the analysis of hyperspectral images associated to the method of decision tree.

Meat Science 133 (2017) 43–50

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci

An application based on the decision tree to classify the marbling of beef by hyperspectral imaging

Lía Velásquez[a], J.P. Cruz-Tirado[a], Raúl Siche[a,*], Roberto Quevedo[b]

[a] Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, Ciudad Universitaria, Trujillo, Peru
[b] Fitogen Program, Department of Aquaculture and Agrifood Resources, Universidad de Los Lagos, Av. Fuchslocher 1305, Osorno, Chile

Lo conocido

- Antecedentes

Lo desconocido

Objetivo

INTERNATIONAL JOURNAL OF FOOD PROPERTIES
2017, VOL. 20, NO. S2, S1264–S1297
https://doi.org/10.1080/10942912.2017.1338729

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# Evaluation of biological contaminants in foods by hyperspectral imaging: A review

Ricardo Vejarano[a,b], Raúl Siche [a], and Wendu Tesfaye[c]

[a]Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo (UNT), Ciudad Universitaria, Trujillo, Peru; [b]Facultad de Ingeniería, Universidad Privada del Norte (UPN), Trujillo, Peru; [c]Departamento de Química y Tecnología de Alimentos, Universidad Politécnica de Madrid (UPM), Madrid, Spain

**Artículo de Revisión**

## Introduction

Food quality and safety problems are receiving increasing attention in both developed and developing countries,[1] and these issues are frequently confronted in our daily life because in today's markets there is an increasing demand for safe and quality products and also because food safety legislations have become more and more stringent.[2]

The food industry is actually focused on developing innocuous products and requires a constant commitment to the design and implementation of procedures and systems to control various parameters in food products (Fig. 1). Currently available analytical techniques are mostly slow methods and destructive too. Therefore, it is urgent to develop non-invasive, efficient, and quick testing method for monitoring food quality and safety.[3] Of all the available options, hyperspectral imaging (HSI) technology is shown as one of the most promising alternatives, being a non-destructive analysis technology that can easily engage in productive processes.

Several recent review articles have been published on applications of HSI which is primarily concerned with overall food quality and safety evaluation,[3–13] and others have been mainly focused on determination of chemical and microbiological contamination on food products.[1,2,14,15] However, there is not any paper which specifically addresses on the application of HSI to evaluate different contaminants of biological origin in food products, such as spoilage microorganisms that can attack agricultural crops and cause losses in production output and quality; microorganisms causing deterioration and quality loss in ready-to-eat foods, especially pathogens and/or their toxins; different organic residues that can be a vehicle for different microbial contaminants; and parasites.

It is estimated that between 10% and 50% of agricultural production, especially grains and vegetables, are lost each year as a result of microbial contamination.[16] Besides, it is estimated that 42% of foodborne illnesses are mainly caused by contaminating microorganisms, especially pathogenic bacteria.[17] For instance, in the United States, it is estimated that each year roughly 1 in 6 Americans (about 48 million people) gets sick, where around 128,000 were hospitalized, and 3000 died of foodborne diseases.[18] Therefore, this review focuses on the most notable application of HSI for detecting such contaminations at any level of food production chain, which includes the production of agricultural raw materials, and the industrial processing, packaging, and the storage conditions, that is, from farm to table.

Problema

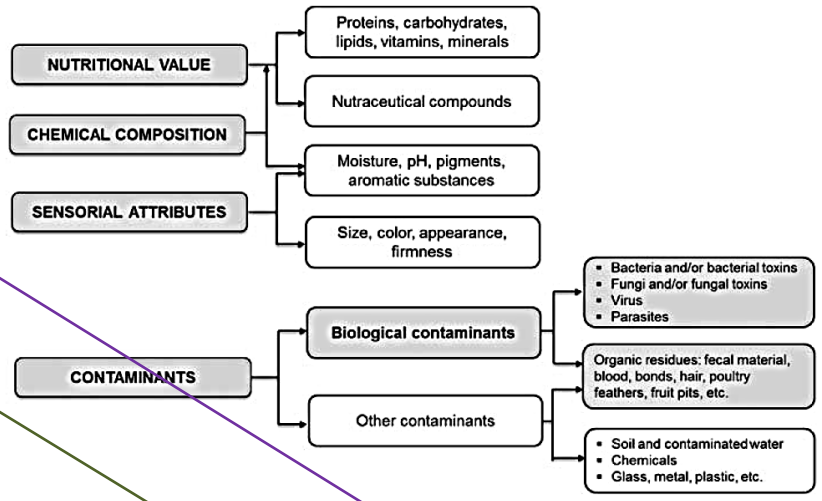


Figure 1. Main parameters controlled in food production.

Antecedentes

Vacío en el Estado del Arte

Objetivo

Food Eng Rev (2016) 8:306–322
DOI 10.1007/s12393-015-9137-8

REVIEW ARTICLE

## Artículo de Revisión

# Evaluation of Food Quality and Safety with Hyperspectral Imaging (HSI)

Raúl Siche[1] · Ricardo Vejarano[1] · Victor Aredo[1] · Lia Velasquez[1] · Erick Saldaña[2] · Roberto Quevedo[3]

## Introduction

The current food industry is focused on developing innocuous products that meet the quality requirements demanded by the market, but using technologies quick and accurate response [99], with less product loss during the analysis.

Of the many available technologies, hyperspectral imaging (HSI) is shown as a promising alternative, offering speed, accuracy, reliability, besides being a nondestructive analysis technology that can be attached along the different production processes [28], obtaining information immediately, something that other technologies cannot do.

To this must be added the efforts of the scientific community that directed significant research toward optimizing the adaptability of HSI to the food production processes, which is evidenced by the different studies published in the last decade (Fig. 1).

Figure 1 shows that from the year 2011 there have been a considerable increase in number of studies on the application of HSI in life sciences. This indicates that, as an alternative technology, the acceptance of HSI by industry was increasing, thanks to the advantages already mentioned above.

The objective of this review is to gather the most important studies conducted on the application of HSI in the evaluation of the quality and safety of food, referring first to the fundamentals of this analytical technology and then detailing its application to different food groups.

Problema

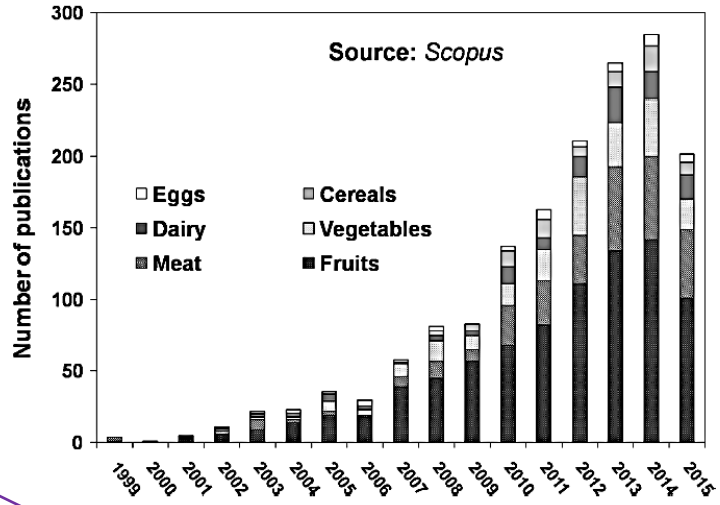


**Fig. 1** Publications of scientific articles on the application of hyperspectral imaging (HSI) in the food industry. Information obtained from the database Scopus (search criteria: ALL FIELDS: "hyperspectral imaging" and ARTICLE TITLE, ABSTRACT, KEYWORDS: "each group of food")

Antecedentes

Objetivo

# 10 preguntas en la redacción de un artículo científico (AC)

Importancia de publicar un AC

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9. **¿A quién agradecer en un AC?**
10. **¿Qué estilo utilizar para redactar las referencias bibliográficas?**

El camino de un AC hasta su publicación

En esta sección se describe **CÓMO** se realizó el estudio de tal manera que otros puedan reproducirlo (**REPRODUCIBILIDAD**).

Incluir:

- Informar a los lectores sobre los procedimientos elegidos en la investigación.
- Informar las formas en que se analizaron los resultados.

# MATERIALES Y MÉTODOS

*Current Nutrition & Food Science*, 2016, *12*, 65-71 65

## Antioxidant Capacity of Binary and Ternary Mixtures of Orange, Grape, and Starfruit Juices

Raúl Siche[1,*], Carmen Ávalos[1], Hubert Arteaga[1], Erick Saldaña[2] and Thais M. F. S. Vieira [2]

[1] *Instituto Regional de Investigación Agraria, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n. Ciudad Universitaria, Trujillo, Peru;* [2]*Department of Agro-industry, Food and Nutrition, "Luiz de Queiroz" Agricultural College, University of São Paulo, Brazil*

### 2. MATERIALS AND METHODS

#### 2.1. Raw Material

Orange (var. Washington navel), red grape (var. Alfonso Lavallet), and starfruit (var. Golden Star) samples were obtained from the cities of Huaral (Lima, Peru), Gran Chimu (La Libertad, Peru) and Viru (La Libertad, Peru), respectively, and immediately were subjected to juice preparation.

#### 2.2. Process for Obtaining Juices

The raw materials were selected based on their state of maturity and macroscopic high quality. Selected fruits were washed to remove foreign material. Juices were extracted by cold compression or crushing (for oranges) (Pulper DFV 19-40 I/C, Vulcano, Peru). Subsequently, in order to remove traces of bark, seeds and excess of pulp in the juice, raw juices were filtered under vacuum (through a 110 mm diameter Buchner funnel using Whatman No. 40). Finally, glass bottles were filled with the juices, covered with aluminum foil to prevent oxidation and stored in domestic refrigerator (7±1 °C) until further analysis.

#### 2.5. *In vitro* Antioxidant Capacity of Mixtures

Pure samples and mixtures in study were subjected to analysis in order to measure the *in vitro* antioxidant capacity by a method developed by Brand-Williams *et al.* [20], adapted by the Department of Pharmacognosy and Pharmacobotany of National University of Trujillo, that is based on the reduction of absorbance at 517 nm of 0.1 mM DPPH radical. The reactions were performed using 5 mL of DPPH ethanol solution at 0.1 mM as volume, and 50 µL of sample. The mixture was homogenized carefully; it was left to stand at room temperature protected from light over 30 minutes before absorbance at 517 nm reading. A spectrophotometer (SpectroQuest 4802 UV-Vis, UNICO, USA) was used and methanol and 0.1 mM DPPH solutions were used as negative and positive control. The percentage of DPPH radical scavenging (% $DPPH_{Radical\_scavenging}$) of the tested sample was calculated by the Equation 1:

$$\%\ DPPH_{Radical\_scavenging} = (Abs\ control - Abs\ sample)*100 / (Abs\ control) \quad \text{(Eq. 1)}$$

# MATERIALES Y MÉTODOS

Commun Nonlinear Sci Numer Simulat 15 (2010) 3182–3192

Contents lists available at ScienceDirect

Commun Nonlinear Sci Numer Simulat

journal homepage: www.elsevier.com/locate/cnsns

## Convergence of ecological footprint and emergy analysis as a sustainability indicator of countries: Peru as case study

Raúl Siche [a,*], Lucas Pereira [b], Feni Agostinho [b], Enrique Ortega [b]

[a] Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, C. Universitaria, Trujillo, Peru
[b] Ecological Engineering Laboratory, Food Eng. School, State University of Campinas, UNICAMP, Cx. Postal 6121, CEP 13083-862, Campinas, SP, Brazil



resource [28]. Since the real wealth can be measured by the work previously done to produce something, Emergy is considered a scientific measure of real wealth in terms of the energy previously required to make something [29].

Emergy analysis (EA) allows the accounting for additional flows that influence sustainability, such as waste, soil loss, human-labor, water use, among others. Besides that, all previous available energy used to make something is considered in the calculation procedure, presenting the energy memory of the product or process in the final indicators. On the other hand, EA presents some deficiencies, mainly those related to criteria and accuracy. Below, there is a brief description of the deficiencies on the emergy methodology that we consider important for the purpose of the present paper:

(a) EA does not define which is its sustainability indicator. Possible indicators are renewability (%R, [3]) or emergy sustainability index (ESI, [49]). Some published papers consider ESI as the sustainability indicator, but others consider the %R, or even all emergy indices assessed at the same time.
(b) Renewability and emergy sustainability index do not have standards. For example, some authors indicate that in a long time perspective systems with high values of renewability emergy index are acceptable [3], but what is the minimum value of renewability to be considered sustainable? For processes and products, the use of ESI index is more enlightening. Brown and Uligiati [3] indicate that for values of ESI below 1, products and processes are not sustainable at a long time period, while they are rather sustainable if ESI equals 1, and clearly sustainable for ESI higher than 5.
(c) Assuming a country's emergy assessment, only the biggest natural renewable flow is considered to avoid double accounting [29]. That procedure occurs, because all of the natural emergy flows come from the same emergy baseline. That approach may be a temporary solution, but the methodology does not consider the flows from internal natural capital storages that produce several environmental services and contribute to the health of human-dominated systems. As well as non-renewable internal storages such as soil, minerals, natural gas, coal, and so on are considered in the analysis, we believe that natural capital should be accounted for as a natural renewable resource.
(d) The lack of available emergy intensity[3] factors with good quality is a deficiency of the emergy methodology. We consider that the International Society for the Advancement of Emergy Research (ISAER, http://www.emergysociety.org) could elaborate a handbook with several emergy intensity factors with controlled quality, taking into account different criteria for that purpose as numeraire (energy, exergy or mass), emergy baseline, technology and calculation year.

By far, strong points overcome weakness on both ecological footprint and emergy analysis methods. Knowing their limitations and advantages allows an attempt for their mutual improvement. The objective of this work is to discuss a potential convergent approach between EF-GAEZ and EA, and apply it to a case study.

### 2. Proposed method for EF calculation based on emergy: emergetic ecological footprint (EEF)

A new approach based on EF-GAEZ and EA was originally proposed by Zhao et al. [61], slightly modified and used by Chen and Chen [6,7] to investigate the resource consumption of the Chinese society from 1981 to 2001 and by Siche et al. [41] to make a diagnosis of Peru using 2004 data. Zhao's approach consists in calculating biocapacity as natural renewable resources and the footprint as the system consumption, both in emergy units. The calculation procedure is basically to obtain those resources and consumption data in energy and/or mass flows, and convert them in solar emjoules (seJ) using the respective emergy intensity factors. After that, biocapacity and footprint can be estimated using the empower density[4] (seJ $ha^{-1}$ – global empower density in the biocapacity calculation, and local for footprint calculation).

Zhao et al. [61] introduced EA's concepts into the EF framework, but that approach did not remove main weaknesses found in the original methodologies. For example, the three main natural external flows that drive the biosphere (solar radiation, deep Earth heat and tidal energy) are considered to calculate the biocapacity. We consider that procedure correct in order to calculate the amount of natural external renewable resources that the systems consume, but not to calculate the biocapacity. In other words, Zhao et al. [61] considers a biocapacity based on natural renewable external flows, not accounting for the energy and mass flows supplied by available internal storages of natural capital.

We suggest four changes in this present paper aiming to improve Zhao's approach:

(a) *Biocapacity calculation.* Calculate biocapacity as function of natural renewable resources in emergy units, considering the sum of solar radiation, deep Earth heat, tidal energy and internal natural capital storage. The novelty presented here is the inclusion of the item internal natural capital (storage) responsible for producing several ecosystem services (flows). At this time, we assumed that flows could be represented by the net primary productivity (NPP) of preserved natural forest systems. So, we considered the forest biomass accumulated in a year period as the amount of energy flow available from natural capital storage.

Usando textos



(b) *Biocapacity calculation.* Reserve a percentage of 14.2% from the total biocapacity aiming to cover other species needs. In this present work, that percentage corresponds to Peru's area with natural vegetation envisioning biodiversity preservation [17]. Venetoulis and Talberth [55] took the first step towards making formal accommodation for other species reserving 13.4% of the biocapacity. Existing gap studies suggest that if approximately 13.4% of the terrestrial land on Earth were protected, 55% of all species that are significantly threatened with extinction would meet targets for survival [37]. In regions with high levels of species richness and endemism, large percentages of their territory would require protection.
(c) *Footprint calculation.* Include two important categories: soil loss and water consumption. Those categories are not accounted for in the EF-GAEZ method, neither in Zhao's approach. Water and soil are essential factors to agricultural production. In fact, water is so important to human activities that Hoekstra and Hung [14] stated that it should be considered an economic good. Nowadays, problems with water are related to its scarcity, excess and deterioration of its quality. Another major factor endangering the long term food supply is the loss of soil fertility [11]. High technology agricultural systems cause the loss of top soil at an impressive rate: corn production in Iowa, USA, implies the loss of about 20–30 tons of top soil per year per hectare; a sustainable system would tolerate a loss of only 1 ton $ha^{-1}$ $year^{-1}$ [35]. Similar situation is found in populated developing countries: 30 ton $ha^{-1}$ $year^{-1}$ in India and 40 ton $ha^{-1}$ $year^{-1}$ in China. Considering that 500 years are needed to restore 2.5 cm of top soil [35], soil loss is a serious form of biophysical capital depletion.
(d) *Biocapacity and footprint calculation.* The use of global empower density (GED) is different than the use of local empower density (LED) as proposed by Zhao et al. [61]. LED (in seJ $ha^{-1}$, where ha is equivalent to local hectares) corresponds to obtain a footprint in local hectares. Using GED (in seJ $ha^{-1}$, where ha is equivalent to global hectares) corresponds to obtain results in global hectares. Zhao et al. [61] have used LED for footprint and GED for biocapacity, but in this present paper, GED was used for both indicators, making it possible to compare them.
(e) *Biocapacity and footprint calculation.* Consider the total area of evaluated systems. As previously discussed, EF-GAEZ excludes areas where resources do not appear to be directly utilized for the purpose of human consumption and waste assimilation. This exclusion, however, disregards the role that these areas provide in generating global biocapacity or supporting critical ecosystem services that sustain both human and non-human life on the planet. From our perspective, however, the entire surface of the Earth is relevant since most of the surface participates in the carbon cycle. This change also acknowledges the interconnectedness of the biosphere.

#### 2.1. Biocapacity calculation

Biocapacity should be calculated as function of available renewable resources. The quantity of natural renewable resources for countries varies, but the main sources are solar radiation, tidal energy, deep Earth heat and internal storage of natural capital. All those natural renewable flows in energy and/or mass units are accounted for in the biocapacity calculation. The accounting for natural capital is a novelty in this work compared to Zhao's et al. [61] approach that have considered the baseline emergy flows as biocapacity. Natural capital is an internal storage of a country that was filled up during several decades (or even centuries) by external natural energy flows. Nowadays, mainly the under development countries are dependent of that storage. For that reason, we have considered natural capital as a supplier of renewable resources, i.e. it was accounted for in the total biocapacity.

The conversion of energy and/or mass flows to emergy flows is made using the emergy intensity factors: emergy (seJ) = energy or mass flow (J or kg) * emergy intensity factor (seJ $J^{-1}$ or seJ $kg^{-1}$). After that, emergy per capita is calculated through the division of each emergy flow by the population of the country under study, resulting in seJ $person^{-1}$ units. In order to obtain the biocapacity per capita (BCp in gha $person^{-1}$) in units of area, the emergy of biocapacity per capita (EMBCp in seJ $person^{-1}$) of each flow are divided by global empower density (GED, $3.1 \times 10^{14}$ seJ $gha^{-1}$ from [61]): BCp (gha $person^{-1}$) = EMBCp (seJ $person^{-1}$)/GED (seJ $gha^{-1}$).

Finally, all the flows in global hectares per capita are summed up and the percentage of 14.2% is subtracted, aiming the preservation of other species. The final value obtained represents the total biocapacity available in global hectares per capita of the evaluated system.

#### 2.2. Footprint calculation

Consumption was divided in seven categories: agriculture (including food and soil loss), pasture, fishing areas, wood and firewood, nonrenewable energy resources, hydroelectricity, and potable water for human use. Those categories are very similar to Zhao's et al. [61] approach, but here we have considered two new categories: soil loss and potable water for human use. Consumption of each category, except soil loss and water use, was calculated through the following expression: Consumption = Production + Importation − Exportation.

Soil loss category (SL) in energy units was obtained using the following equation: SL (J $yr^{-1}$) = current soil loss (g $m^{-2}$ $year^{-1}$) * area of crop ($m^2$) percentage of organic matter * energy content in organic matter (J $g^{-1}$), where percentage of organic matter is estimated as 3% [2], energy content in dry organic matter is 22,604 J $g^{-1}$ [2]. In this work, soil loss category considers only the organic matter lost in erosion processes.

# MATERIALES Y MÉTODOS

*Ecological Questions* 10/2008: 99– 101 DOI: 10.2478/v10090–009–0011–2

Emergy and value of the net primary production (NPP) above ground in natural areas

**Raúl Siche*, Enrique Ortega****

*Escuela de Ingeniería Agroindustrial – Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n. Ciudad Universitaria, Trujillo, Peru
**Laboratório de Engenharia Ecológica e Informática Aplicada – DEA/FEA, Universidade Estadual de Campinas, Campinas, SP, Brasil CEP: 13083–970
corresponding author, e-mail: ortega@fea.unicamp.br



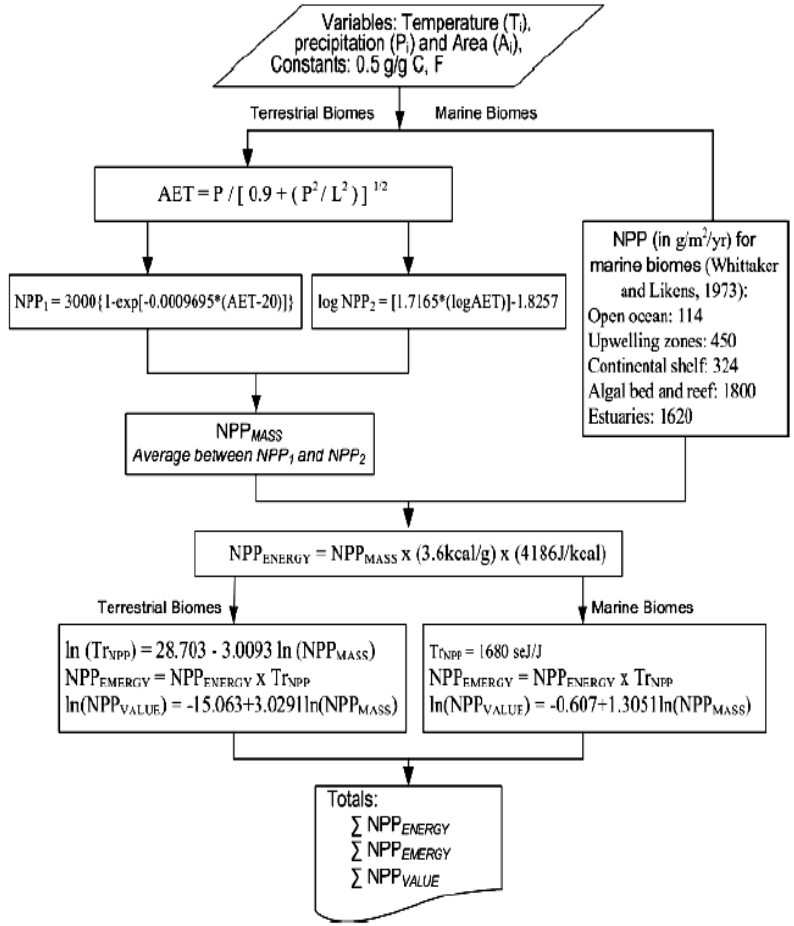


Figure 1. Algorithm used to calculate the net primary productivity of natural areas

Usando algoritmos y fórmulas

# MATERIALES Y MÉTODOS

Meat Science 133 (2017) 43–50

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Meat Science

journal homepage: www.elsevier.com/locate/meatsci

An application based on the decision tree to classify the marbling of beef by hyperspectral imaging

Lía Velásquez[a], J.P. Cruz-Tirado[a], Raúl Siche[a,*], Roberto Quevedo[b]

[a] Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, Ciudad Universitaria, Trujillo, Peru
[b] Fitogen Program, Department of Aquaculture and Agrifood Resources, Universidad de Los Lagos, Av. Fuchslocher 1305, Osorno, Chile

Usando algoritmos y fórmulas

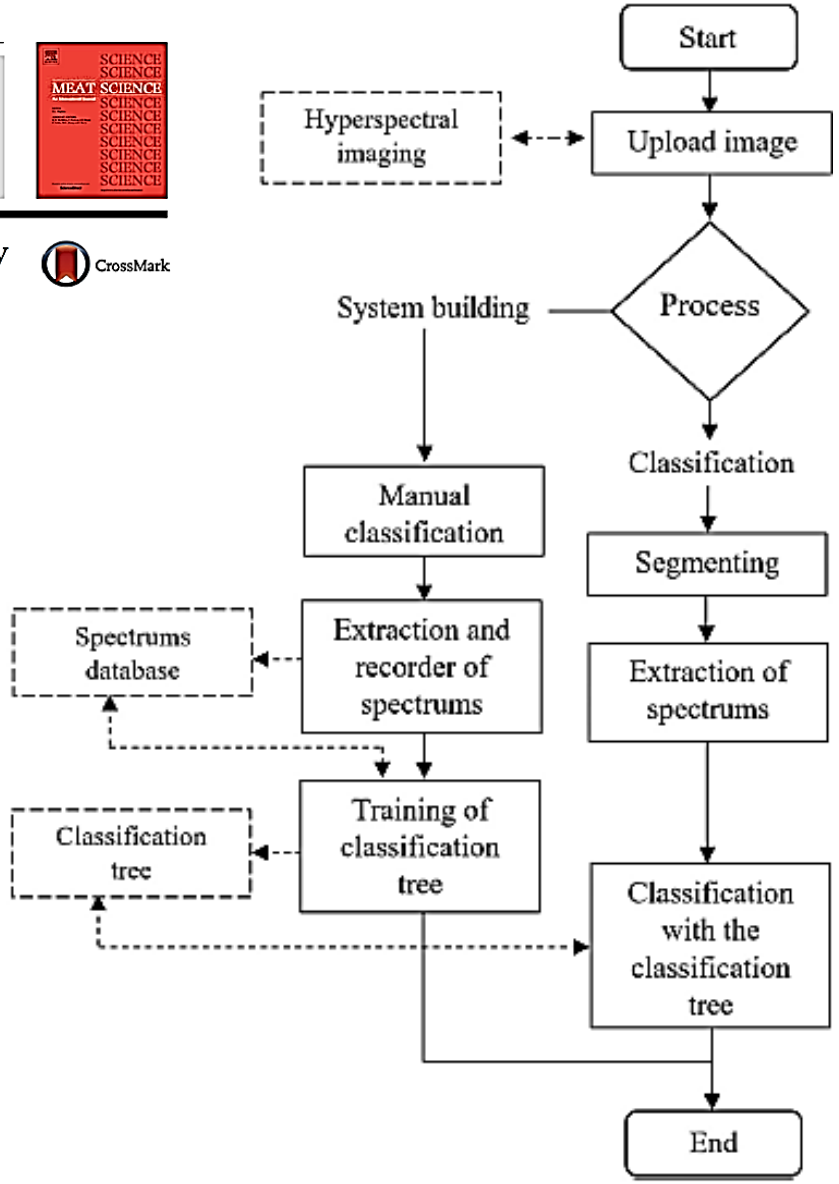


Fig. 3. Algorithm for the hyperspectral image analysis of beef.

# MATERIALES Y MÉTODOS

ECOLOGICAL MODELLING 210 (2008) 37–57

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## The use of emergy assessment and the Geographical Information System in the diagnosis of small family farms in Brazil

*Feni Agostinho*[a], *Guaraci Diniz*[b], *Raúl Siche*[c], *Enrique Ortega*[a,*]

[a] FEA (College of Food Engineering) – Unicamp, CP 6121, CEP 13083-862 Campinas, SP, Brazil
[b] Sítio Duas Cachoeiras (Farm) – Rodovia SP 360, Km 121, CEP 13908-009 Arcadas, Amparo, SP, Brazil
[c] Escuela de Ingeniería Agroindustrial – Facultad de Ciencias Agropecuarias, Universidad National de Trujillo, Av. Juan Pablo II s/n. C. Universitaria, Trujillo, Peru



In a future perspective where no fossil fuels are available, food production will have to be supported by renewable resources. This situation brings uncertainties about the limits for human existence on the planet (MEA, 2005; Wackernagel et al., 1999; WCED, 1987; Meadows et al., 1972).

It is necessary to adopt agroecological procedures and to prepare new assessment tools to diagnose farms in a fast and efficient way. This analysis should consider the resources from human economy as well as all contributions from nature to produce the output and absorb environmental impacts. The emergy methodology was proposed by Odum (1996) for system analysis, accounting, and diagnosis. The methodology was improved during the last decade. Emergy measures of natural and economic resources are expressed in a common basis: solar equivalent joules (sej). Emergy analysis is based on Biology Energetics (Lotka, 1922), General Systems Theory (Von Bertalanffy, 1968) and Systems Ecology (Odum, 1983). Several ecosystems and economic systems emergy evaluations were made all over the world (Brown and Ulgiati, 2004; Higgins, 2003; Brown and Buranakarn, 2003; Yang et al., 2003; Lefroy and Rydberg, 2003; Qin et al., 2000; Panzieri et al., 2002, 2000; Ulgiati and Brown, 1998), as well as theoretical studies and discussions (Herendeen, 2004; Hau and Bakshi, 2004; Brown et al., 2004; Bastianoni and Marchettini, 2000). However, there are few emergy studies that evaluate agricultural production (Ortega et al., 2002; Martin et al., 2006; Castellini et al., 2006), especially of small family farms, which have singular characteristics.

The objective of this research is to demonstrate that emergy analysis can show farm performance more clearly with the support of Geographical Information Systems, and to suggest better management practices for the improvement of farming systems.

## 2. Methodology

### 2.1. Description of the farming systems

Two agricultural production models were compared: (a) the chemical or conventional model, which has the increase of economic profit as its unique objective, and (b) the agroecological model, that envisions sustainable development. Three agricultural farms located in Amparo County, São Paulo state, Brazil (Fig. 1) were evaluated: Duas Cachoeiras farm (29.7 ha), Santa Helena farm (15.6 ha) and Três Lagos farm (25.3 ha). The three farms have the same climate conditions (solar radiation, wind speed and direction, amount of rain, relative humidity), the same soil characteristics, the same land relief, approximately the same area, and all are family managed. The main difference between the farms is the production model (conventional or agroecological) adopted.

Duas Cachoeiras farm adopted Agroecology in 1985. During the last two decades, it has implemented soil decontamination and natural fertility recovery, reforestation and local biodiversity recovery, chemical input free food production, internal residue cycling (nutrients), enhanced use of local resources, and introduction of extension work, ecological tourism and education. The other two farms use the chemical


**Fig. 1 – Study area. Brazil Country, Sao Paulo State, Amparo County. TL: Três Lagos farm; DC: Duas Cachoeiras farm; SH: Santa Helena farm.**

model. Santa Helena produces vegetables, fruits, and coffee. Três Lagos produces milk and meat.

### 2.2. Emergy methodology

The emergy analysis is based on the works of Odum (1996), Ulgiati and Brown (1998), and Brown and Ulgiati (2004). The first step in the application of the emergy methodology is to construct system diagrams to identify all components and their relationships. Fig. 2 shows an aggregated flow diagram that uses a symbolic language to represent the flows and interactions. Table 1 shows the description of the emergy flows.

The second step is to build the emergy table, placing the numerical value and the units of each flow mentioned in the diagram. The table allows the conversion of all the resources in terms of solar emergy joules using transformities (Odum, 1996). The third step is to obtain the emergy indicators (Table 2) in order to evaluate the system environmental performance.

This work incorporates some changes in emergy methodology in order to get closer to reality. These changes are the following:

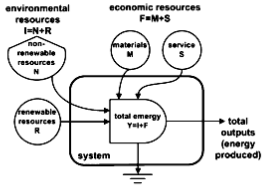


**Fig. 2 – Emergy system diagram of a generic production system.**



**Table 1 – Classification of emergy flows used in environmental accounting**

| Inputs and services | Description |
|---|---|
| Nature contributions (I) | R + N |
| Renewable natural resources (R) | Rain, materials, and services from preserved areas, nutrients from soil minerals and air |
| Non-renewable natural resources (N) | Soil, biodiversity, people exclusion |
| Feedback from economy (F) | F = M + S |
| Materials (M) | $M = M_R + M_N$ |
| Renewable materials and energy ($M_R$) | Renewable materials of natural origin |
| Non-renewable materials and energy ($M_N$) | Minerals, chemicals, steel, fuel, etc. |
| Services (S) | $S = S_R + S_N$ |
| Renewable services ($S_R$) | Manpower supported by renewable sources |
| Non-renewable services ($S_N$) | Other (external) services, taxes, insurance, etc. |
| Total emergy (Y) | Y = I + F |

Ortega et al., 2002.

(1) The renewability factor of each item have been considered, according to Ulgiati et al. (1994), Ortega et al. (2005, 2002), Ortega and Polidoro (2002), Ulgiati et al. (2005) and Cavalett et al. (2006). The emergy indexes were slightly changed to evaluate sustainability more properly, by considering renewability of each of the economic resource used. The incorporation of the renewability factor is particularly valid when the system uses materials and services, purchased at the local or regional economy, that are not totally considered as nonrenewable resource (such as labor, electricity power, manure and services). Thus, the incorporation of the renewability factor should be added to emergy methodology when applied to assess sustainability (Ortega et al., 2005, 2002).

(2) The soil loss was calculated through the Universal Soil Loss Equation (USLE) in accordance with Wischmeier and Smith (1978) and the aid of the Geographical Information System (GIS). Soil loss equation enumerates the main factors that influence the rain erosion. The equation (USLE) is expressed as follows: $A = R \times K \times L \times S \times C \times P$, where $A$ = soil loss given by area unit [t/(ha year)]; $R$ = rain factor; expression of rain erosion [MJ mm/(ha h year)]; $K$ = soil erodibility factor [t h/(MJ mm)]; $L$ = slope length factor [non-dimensional]; $S$ = slope steepness factor [non-dimensional]; $C$ = cover-management factor [non-dimensional]; $P$ = support practice factor [non-dimensional]. Aerial photographs were obtained from the archives of Amparo City Hall (scale 1:30,000), covering the three research units. Initially they were geographically located through ERDAS Imagine software (version 8.7) and exported to GIS software (ArcGIS 9.0) for constructing thematic maps (land use and soil type). The factors required by soil loss equation were obtained through several works (Resende and Almeida, 1985; Bertoni and Lombardi Neto, 1999; Guerra et al., 1999; Gabriels et al., 2003; Lu et al., 2004; Shi et al., 2004) and linked to these maps. An Arc Macro Language (AML) routine was used to determine the topographical factor in Arc Info Workstation 9.0, according to Lu et al. (2004). The AML routine was developed by Hickey (2000) and Van Remortel et al. (2001), and is available at the Internet address: http://www.cwu.edu/~rhickey/slope/slope.html. The flowchart used to calculate soil loss can be seen in Fig. 3. Through this procedure, the amount of soil loss calculated is closer to the reality of the specific location;

(3) For the agroecological system analyzed in this work, the ground macronutrients (nitrogen, potash, phosphorus and limestone) removed in the harvest (see Table 3) have been considered as renewable resources from nature, since the process used in the farm makes the acquisition of macronutrients from external sources unnecessary (Agostinho, 2005). The green manure (fertilization using leguminous plants), the incorporation of animal manure, compost and organic matter surplus after harvest to the ground ensure that the amount of ground minerals removed in the crop could be replaced in a renewable way. Since 1985, Duas Cachoeiras farm uses no chemical inputs in food production, displaying a ground mineral extraction equal to or lower than natural restoration;

(4) The fact that the farms have native vegetation areas, which besides serving as a natural defense against plagues, causes some rain water to infiltrate the ground. This increases the amount of water in underground watersheds (Agostinho, 2005). The land use, soil type, soil handling and landscape slope are the most important factors that affect the water pathways after the rain initiates. There are mathematical models able to estimate the water infiltration in the ground, runoff and interception by vegetal covering, but all of them demand many raw data. The calculation of water infiltration into the ground considering vegetable covering was not the main aim of this paper, thus there were used previous works by other researchers (Adekalu et al., 2007; Souza and Alves, 2003; Centurion et al., 2001; Lima, 1996). The following percentages were considered: 30% for forest areas and silviculture; 20% for Napier grass, maize, orchard, chayote, meadows and annual culture; 5% for grassland and cultures with low biomass accumulation. Through the GIS land use map of the three properties (Figs. 4–6) with the values of plant covering areas expressed in hectares and the respective rain infiltration ratio (%), it was possible to estimate the water

**Table 2 – Emergy indicators**

| Indicator | Expression | Meaning |
|---|---|---|
| Solar transformity (Tr) | Y/E | The ratio of the emergy of the output divided by the energy of the products. |
| Renewability (%R) | $100x(R + M_R + S_R)/Y$ | The ratio of the renewable inputs divided by the total emergy of the system. |
| Emergy yield ratio (EYR) | $Y/(M_N + S_N)$ | The ratio of total emergy used divided by the emergy of nonrenewable inputs from the economy. |
| Emergy investment ratio (EIR) | $(M_N + S_N)/(R + M_R + S_R + N)$ | The ratio of emergy of nonrenewable economic inputs divided by the emergy of nature investment (nature input plus renewable inputs from economy). |
| Emergy exchange ratio (EER) | Y/[$] × (sej/$) | The ratio of emergy delivered by the producer to the economy divided by the emergy received from the buyer. |
| Environmental loading ratio (ELR) | $(N + M_N + S_N)/(R + M_R + S_R)$ | The ratio of nonrenewable emergy and renewable inputs. |
| Emergy sustainability index (ESI) | EYR/ELR | Indicates the sustainability of the system. |

Source: Ortega et al., 2002; based on Odum, 1996.



**Table 3 – Calculation of nutrients removed from the ground**

| Product | Protein[a] (g) | P[b] (g) ($\times 10^{-3}$) | K[b] (g) ($\times 10^{-3}$) | N[b] (g) | Ca[b] (g) ($\times 10^{-3}$) | Others[a] (g) ($\times 10^{-3}$) |
|---|---|---|---|---|---|---|
| Maize | 9 | 210 | 287 | 1.44 | 7 | 167 |
| Sunflower | 23 | 705 | 689 | 3.68 | 116 | 373 |
| Beans | 4 | 37 | 187 | 0.64 | 17 | 28 |
| Pumpkin | 1 | 44 | 340 | 0.16 | 21 | 14 |
| Cassava | 1 | 27 | 271 | 0.16 | 16 | 35 |
| Sweet potato | 2 | 28 | 204 | 0.32 | 22 | 24 |
| Rice | 15 | 433 | 427 | 2.40 | 21 | 194 |
| Soybean | 13 | 194 | 620 | 2.08 | 197 | 86 |
| Vegetable | 1 | 23 | 257 | 0.16 | 32 | 18 |
| Fruit | 1 | 11 | 156 | 0.16 | 10 | 11 |

| Product | Productivity (kg/ha year) | P (kg/ha year) | K (kg/ha year) | N (kg/ha year) | Ca (kg/ha year) | Others (kg/ha year) |
|---|---|---|---|---|---|---|
| Maize | 3,000 | 6.3 | 8.6 | 43.2 | 0.2 | 5.0 |
| Sunflower | 1,000 | 7.0 | 6.9 | 36.8 | 1.1 | 3.7 |
| Beans | 900 | 0.3 | 1.6 | 5.7 | 0.1 | 0.2 |
| Pumpkin | 3,500 | 1.5 | 11.9 | 5.6 | 0.7 | 0.5 |
| Cassava | 10,000 | 2.7 | 27.1 | 16.0 | 1.6 | 3.5 |
| Sweet potato | 10,000 | 2.8 | 20.4 | 32.0 | 2.2 | 2.4 |
| Rice | 2,500 | 10.8 | 10.6 | 60.0 | 0.5 | 4.8 |
| Soybean | 2,400 | 4.6 | 14.8 | 49.9 | 4.7 | 2.0 |
| Vegetable | 30,000 | 6.9 | 77.1 | 48.0 | 9.6 | 5.4 |
| Fruit | 10,000 | 1.1 | 15.6 | 16.0 | 1.0 | 1.1 |
| Total | | 44.0 | 194.6 | 313.2 | 21.7 | 28.6 |

Duas Cachoeiras farm, year 2003.
[a] Source: Table of Chemical Composition of Foods. U.S. Department of Agriculture, Agricultural Research Service. Nutrient Database for Standard Reference, release 14. Amount of nutrients in 100 g of sample. Available at http://www.unifesp.br/dis/servicos/nutri, accessed on 18th June 2004. P, phosphate; K, Potash; N, Nitrogen; Ca, Limestone;
[b] The amount of nitrogen corresponds approximately 16% of protein amount.

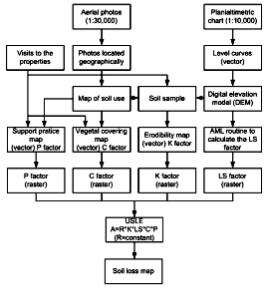


**Fig. 3 – Flowchart used in soil loss calculation.**

Combinación: textos, figuras, tablas, flujos, fórmulas

# MATERIALES Y MÉTODOS

Journal of Texture Studies
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**USE OF RESPONSE SURFACE METHODOLOGY TO DESCRIBE THE COMBINED EFFECT OF TEMPERATURE AND FIBER ON THE RHEOLOGICAL PROPERTIES OF ORANGE JUICE**

RAÚL SICHE[1], VÍCTOR FALGUERA[2] and ALBERT IBARZ[3,4]

[1]Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Trujillo, Peru
[2]Agricultural Knowledge & Innovation Services (AKIS International), Albatàrrec, Spain
[3]Departament de Tecnologiad'Aliments, Universitat de Lleida, Av. Rovira Roure, 191, Lleida 25198, Spain

## MATERIALS AND METHODS

To ensure standardization and repeatability of the tests, a concentrated clarified and depectinized orange juice (57.1°Brix) was used, provided by Nufri (Mollerussa, Spain). This juice was diluted with distilled water to 12°Brix for the production of a single-strength juice. Soluble solids were determined by means of a refractometer (Atago RX-1000, Atago Bussan Co., Tokyo, Japan) at 20C. The orange fiber was provided by Indulleida, SA (Alguaire, Spain). The fiber was mixed with the clarified juice for 3 min at 15,000 rpm using a homogenizer (Ultra-Turrax T25, IKA, Staufen, Germany) to obtain juices with fiber at the desired concentration ($C_f$ = 0–12.5% w/w).

Rheological measurements were carried out in a rheometer (Haake RS-80, Haake, Karlsruhe, Germany) using a Couette-geometry sensor (concentric cylinder; Haake Z40-DIN) with relative cup and bob radius of 1.0847 (bob radius = 20 ± 0.004 mm). The temperature was maintained with a water bath (Phoenix Thermo Haake C25P) with a deviation of less than ±0.3C. Each rheological evaluation was carried out with a new sample without mechanical history. After placing the samples in the rheometer, a relaxing time of 10 min was given before starting the shearing. Steady-state shear experiments were carried out at a shear rate ($\dot{\gamma}$) between 0.01 and 300/s with the exception of pure juice samples, for which a maximum shear rate of 80/s was used due to the formation of Taylor vortices at high values (i.e., secondary turbulent flows cannot be used in the rheological analysis), as described by Steffe (1996). Samples were subjected to shear in a cycle of three flow ramps (up, down and up), and the data from the third ramp were used for analysis (Genovese and Rao 2005; Sato and Cunha 2009; Tonon *et al.* 2009; Silva *et al.* 2010).

A central composite rotatable design for 2 factors × 9 treatments (four factorial, four axial and one central point, as shown in Table 1), with four replicates each, was used. The results were evaluated with Statistica 5.5 (StatSoft, Tulsa, Oklahoma, EEUU) with a significance level of 5%. For comparison, data reported by Siche *et al.* (2012) were also taken. The Herschel–Bulkley model (Eq. 1) was used to study the flow behavior of the samples, where $\sigma_0$ is the yield stress, $k$ is the consistency index and $n$ is the flow behavior index:

$$\sigma = \sigma_0 + k\dot{\gamma}^n \quad (1)$$

# En artículos de revisión

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Review article

## Torque-Teno virus viral load as a potential endogenous marker of immune function in solid organ transplantation

Omid Rezahosseini [a], Camilla Heldbjerg Drabe [a], Søren Schwartz Sørensen [b], Allan Rasmussen [c], Michael Perch [d], Sisse Rye Ostrowski [e], Susanne Dam Nielsen [a,*]

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      4.2.4. Association with infection and rejection . . . 0

*Abbreviations:* ACR, Acute cellular rejection; ABMR, Antibody-mediated rejection; APCs, Antigen-presenting cells; ATG, Anti-Thymocyte globulins; AUGs, Alternative start codons; BAL, Broncho-alveolar lavage; bp, Base pairs; CCL7, Chemokine ligand 7; CD, Cluster of differentiation; CEBM, Center for evidence-based medicine; CLAD, Chronic lung allograft dysfunction; CMV, Cytomegalovirus; CNI, Calcineurin inhibitors; CpGs, Cytosine-phosphate-guanine; CTLA-4, Cytotoxic T-lymphocyte antigen 4; dd-PCR, Digital droplet PCR; EBV, Epstein Barr Virus; ELISA, Enzyme-linked immunosorbent assay; HBV, Hepatitis B virus; HCC, Hepatocellular carcinoma; HCV, Hepatitis C virus; HEV, Hepatitis E virus; HPV, Human Papilloma Virus; HSCT, Hematopoietic stem cell transplantation; IL, Interleukin; miRNAs, micrornas; mRNAs, Messenger RNAs; MS, Multiple sclerosis; mTOR, Mammalian targets of rapamycin; NPV, Negative predictive value; ORF, Open reading frame; PCR, Polymerase chain reaction; PGD, Primary graft dysfunction; PPV, Positive predictive value; SOT, Solid organ transplantation; TAIP, TTV-derived apoptosis-inducing protein; TLR, Toll-like receptor; TNF-α, Tumor necrosis factor-alpha; Tregs, Regulatory T-cells; TTV, Torque-Teno virus..

* Corresponding author at: Viro-immunology Research Unit, Department of Infectious Diseases 8632, Rigshospitalet, University of Copenhagen, Copenhagen, Denmark.
*E-mail address:* sdn@dadlnet.dk (S.D. Nielsen).

# En artículos de revisión

Transplantation Reviews xxx (2019) xxx

Contents lists available at ScienceDirect

Transplantation Reviews

journal homepage: www.elsevier.com/locate/trre

Review article

Torque-Teno virus viral load as a potential endogenous marker of immune function in solid organ transplantation

Omid Rezahosseini [a], Camilla Heldbjerg Drabe [a], Søren Schwartz Sørensen [b], Allan Rasmussen [c], Michael Perch [d], Sisse Rye Ostrowski [e], Susanne Dam Nielsen [a,*]

## 3. Methods

We searched PubMed and Scopus (up to 2018 Dec 31) using this keywords combination: ("TTV" OR "Torquetenovirus" OR "Alphatorquevirus") AND ("Transplant*" OR "reject*" OR "infect*" OR "immune*") and found 185 articles.

We excluded studies that did not refer to SOT, case reports, reviews, duplicates and papers in languages other than English (155 papers excluded).

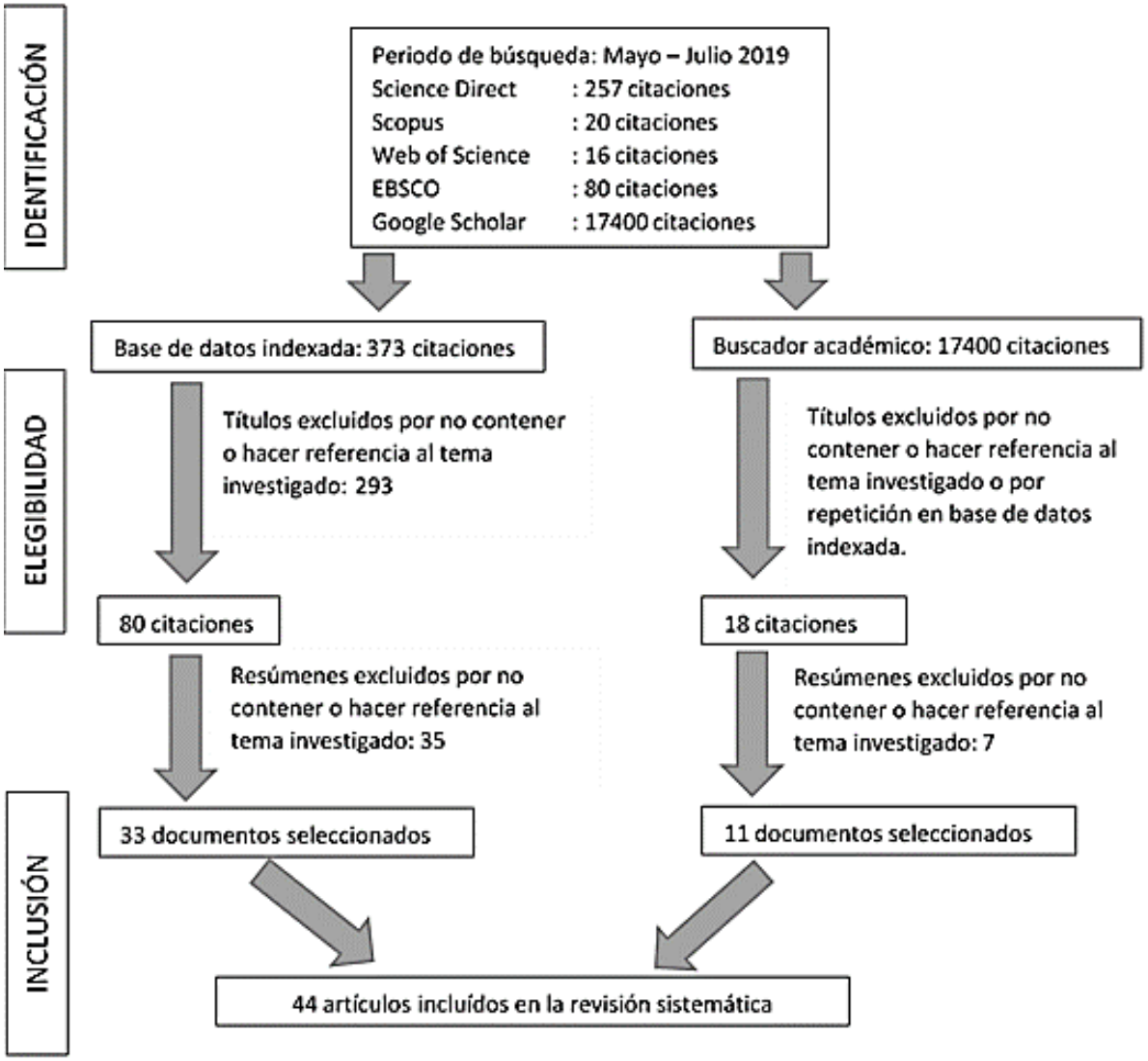
We included 30 articles including original articles, short reports, commentaries (letter to editor) and conference proceedings that appeared to contain information relevant to the TTV and SOT.

We define the type of studies and level of evidence for each article according to guidelines of Oxford center for evidence-based medicine (CEBM) (https://www.cebm.net). This grading system has 5 levels. Studies in level 1 contain the strongest and studies in level 5 include the weakest evidences [57].

## 4. Results and discussion

### *4.1. Solid organ transplantation*

## En artículos de revisión



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9. **¿A quién agradecer en un AC?**
10. **¿Qué estilo utilizar para redactar las referencias bibliográficas?**

El camino de un AC hasta su publicación

# DISCUSIÓN

✓Interprete sus resultados

LWT - Food Science and Technology xxx (2014) 1–7

Contents lists available at ScienceDirect

LWT - Food Science and Technology

journal homepage: www.elsevier.com/locate/lwt

Measurement parameter of color on yacon (*Smallanthus sonchifolius*) slices using a computer vision system

Erick Saldaña [a], Raúl Siche [b,*], Wilson Castro [c], Rosmer Huamán [d], Roberto Quevedo [e]

explains the experimental data acceptably (Gutiérrez-Pulido & de la Vara Salazar, 2004). Also observed was a correlation coefficient near one ($r = 0.9982$), indicating a high degree of correlation.

### 3.5. *Estimation and evaluation of the colorimetric parameters*

Color is an important property related to the chemical composition and the degree of alteration of food over time. The different values of Luminosity ($L^*$) indicates that the reflection of the light in a yacon slice was heterogeneous (Fig. 3). This may have occurred as a result of enzymatic browning, whereby polyphenoloxidase (PPO) catalyzes the conversion of phenolic compounds to quinones, which are polymerized to form dark colored pigments (Sapers & Douglas, 1987). When some fruit is cut, such as yacon, the cut surface turns dark, reducing not only the visual quality, but also results in undesirable changes in the flavor and nutrient loss (Luo & BarbosaCanovas, 1997).

$L^*$ decreases as the samples are darker. Fig. 4 shows that the samples are decreasing in value $L^*$ versus time. For example, average $L^*$ went from 65.99 (0 h) to 60.84 (26 h), meaning that the samples darkened.

The parameters $a^*$ and $b^*$ determine a plane which can represent the individual and combined changes in both parameters, giving an idea of the colorimetric evolution experienced by the sample. The result of enzymatic pigmentation causes to a wide range of $L^*$, $a^*$ and $b^*$ values (Nicolas, Richard-Forget, Goupy, Amiot, & Aubert, 1994; Robards, Prenzler, Tucker, Swatsitang, & Glover, 1999), being $a^*$ suitable for assessing change of color from green to red in fruits (Castaner, Gil, Artes, & TomasBarberan, 1996). Fig. 4 shows that most of the $a^*$ values are positive, indicating a tendency toward red. In addition, $a^*$ change from 7.33 (0 h) to 17.70 (26 h), also interpreted as an approximation to red. The variation of the $b^*$ was not as significant as for the $a^*$, registering an insignificant increase with exposure time (from 35.11 to 41.49, for 0 and 26 h respectively) and a trend toward yellow. These results are consistent with data obtained by Krokida, Oreopoulou, Maroulis, and Marinos-Kouris (2001) and Segnini, Dejmek, and Oste (1999).

From $L^*$, $a^*$ and $b^*$ psychometric coordinates $H^*$ and $C^*$ were obtained. $H^*$ is the hue angle measurement and indicates the relative orientation of the color with respect to the origin (0°) (Chiralt, Martínez-Navarrete, González, Talens, & Moraga, 2007).

$H^*$ decreases from 78.22 to 66.90 in the 26 h of treatment (Fig. 5). These results indicate that the variation in the yellow-green quadrant. $C^*$, or chroma, is the measure of the saturation of the color being measured from the center point of the color space, i.e.,

# DISCUSIÓN

- ✓**Compare** sus resultados con resultados de la literatura y discuta si ellos están en concordancia o discordancia.

Commun Nonlinear Sci Numer Simulat 15 (2010) 3182–3192

Contents lists available at ScienceDirect

Commun Nonlinear Sci Numer Simulat

journal homepage: www.elsevier.com/locate/cnsns

Convergence of ecological footprint and emergy analysis as a sustainability indicator of countries: Peru as case study

Raúl Siche [a,*], Lucas Pereira [b], Feni Agostinho [b], Enrique Ortega [b]

[a] Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, C. Universitaria, Trujillo, Peru
[b] Ecological Engineering Laboratory, Food Eng. School, State University of Campinas, UNICAMP, Cx. Postal 6121, CEP 13083-862, Campinas, SP, Brazil

The $CO_2$ absorption category showed to be the largest bioproductive area of Peru in the EF-ENPP approach with a value of 6.9 gha person$^{-1}$ (Table 5). This value is 5 times greater than 1.3 gha person$^{-1}$ obtained for $CO_2$ absorption category calculated using EF-GAEZ by Siche (2007). This difference occurs because in the EF-GAEZ, Forest area is used to calculate the Biocapacity for $CO_2$ absorption (Monfreda et al., 2004), while in EF-ENPP all areas able to make photosynthesis (i.e. forest, ocean, desert, continental water, etc.) were considered for $CO_2$ absorption.

# DISCUSIÓN

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# DISCUSIÓN

- ✓Dar **valor a sus resultados.** Sea propositivo.

Journal of Texture Studies
A journal to advance the fundamental understanding of food texture and sensory perception

Journal of Texture Studies ISSN 1745-4603

## USE OF RESPONSE SURFACE METHODOLOGY TO DESCRIBE THE COMBINED EFFECT OF TEMPERATURE AND FIBER ON THE RHEOLOGICAL PROPERTIES OF ORANGE JUICE

RAÚL SICHE[1], VÍCTOR FALGUERA[2] and ALBERT IBARZ[3,4]

[1]Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Trujillo, Peru
[2]Agricultural Knowledge & Innovation Services (AKIS International), Albatàrrec, Spain
[3]Departament de Tecnologiad'Aliments, Universitat de Lleida, Av. Rovira Roure, 191, Lleida 25198, Spain

switch to pseudoplastic behavior with flow behavior index values lower than 1. When the fiber content is high enough, fiber particles can interact, forming aggregates that make the flow of fluid more difficult if the applied stress is not enough, i.e., a value of the yield stress appears and the fluid exhibits plastic behavior.

All these facts constitute an important piece of information for the design of the fiber addition process, in a simplified manner; the RSM allows observing the changes in flow behavior in a single plot. On the contrary, with the traditional approach (Fig. 5), the combined effect of fiber concentration and temperature cannot be observed with such precision.

The influence of the addition of orange fiber in the rheological behavior of the obtained juices can be

# DISCUSIÓN

✓Dar **valor a sus resultados.** Sea propositivo.

Meat Science 137 (2018) 176–190

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci

A sensometric approach to the development of mortadella with healthier fats☆

Erick Saldaña[a], Aline de Oliveira Garcia[b], Miriam Mabel Selani[c], Marcia M.H. Haguiwara[d], Marcio Aurelio de Almeida[a], Raúl Siche[e], Carmen J. Contreras-Castillo[a,*]

According to the results (Table 6), it can be stated that CATA questions represent a good alternative to study the sensory characteristics of food products, especially when there is no time and resources available to develop DA. However, it should be take into consideration that CATA questions are easier and faster to perform by consumers (Ares & Jaeger, 2013), with the disadvantage of not allowing to obtain information on the intensities of the attributes.

The use of "CATA ideal" helped to identify the sensory characteristics of the ideal mortadella according to the consumers' perceptions. This method, with PA and PLSR using dummy variables, represents a very useful tool to identify key attributes to be modified in order to improve sample acceptance.

# DISCUSIÓN

- ✓Dar **valor a sus resultados.** Sea propositivo.

LWT - Food Science and Technology xxx (2014) 1–7

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In future work, the computer vision system should be integrated with an artificial neural network using colorimetric and morphometric parameters of food. This integrated system would classify processed or fresh foods according to their sensory quality, and could even be used to estimate sensory shelf life of minimally processed foods.

Artículos de revisión

- Opiniones propias
- Retos Actuales y Futuros

# Retos Futuros

## Artículos de revisión

- Indicar los desafíos científicos y/o tecnológicos que deben ser superados para una aplicación a otra escala o a otro nivel.
- Recomendar investigaciones futuras, otras aplicaciones, nuevos modelos, etc.
- Es posible hacer uso de la literatura para fundamentar algunas proposiciones o recomendaciones.

INTERNATIONAL JOURNAL OF FOOD PROPERTIES
2017, VOL. 20, NO. S2, S1264–S1297
https://doi.org/10.1080/10942912.2017.1338729



# Evaluation of biological contaminants in foods by hyperspectral imaging: A review

Ricardo Vejarano[a,b], Raúl Siche [a], and Wendu Tesfaye[c]

[a]Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo (UNT), Ciudad Universitaria, Trujillo, Peru; [b]Facultad de Ingeniería, Universidad Privada del Norte (UPN), Trujillo, Peru; [c]Departamento de Química y Tecnología de Alimentos, Universidad Politécnica de Madrid (UPM), Madrid, Spain

## Future challenges

On the basis of aforementioned disadvantages, scientific and technological challenges that must be overcome for further application of HSI at the industrial level are

(a) Further research for detecting biological contaminants in liquid foods is needed,[15] since most applications have been focused on solid samples (Tables 2–4).
(b) Quantification of low concentrations of microorganisms, since most studies have been focused on assessing microbial densities higher than $10^2$ CFU/g.[2]
(c) Current studies will need to be extended to other microbial species,[2,92] since most of these studies are limited in detecting and quantifying metabolites produced by microbial contaminants.
(d) Advanced methodologies that allow discrimination between biological contaminants based on its specific "spectral signature."
(e) Optimize the existing models or create more robust models that allow to predict biological contamination from the spectral data obtained, without running the risk of losing valuable information.
(f) Validation of developed models on several storage conditions, simulating real life, for example, at different storage temperatures.[79]
(g) Design of techniques able to fuse the spatial and spectral data, since most of available hyperspectral data processing techniques focus on analysing the spectral data without incorporating information on the spatial data.[3]

# 10 preguntas en la redacción de un artículo científico (AC)

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El camino de un AC hasta su publicación

# CONCLUSIONES

## Artículo de investigación original

# CONCLUSIONES

## Artículo de investigación original

- ✓ Iniciar señalando la **conclusión general** como producto del cumplimiento del objetivo general.
- ✓ Luego mencionar **los principales resultados** que se hayan encontrado.
- ✓ Finalmente resaltar los **aportes o beneficios** de los resultados obtenidos.
- ✓ Es posible incluir **recomendaciones** de trabajos futuros.

# CONCLUSIONES

Meat Science 133 (2017) 43–50

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci

An application based on the decision tree to classify the marbling of beef by hyperspectral imaging

Lía Velásquez[a], J.P. Cruz-Tirado[a], Raúl Siche[a,*], Roberto Quevedo[b]

[a] Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n, Ciudad Universitaria, Trujillo, Peru
[b] Fitogen Program, Department of Aquaculture and Agrifood Resources, Universidad de Los Lagos, Av. Fuchslocher 1305, Osorno, Chile

## 4. Conclusion

The present study demonstrated that VIS/NIR HSI can be used for classifying of the degree of marbling of beef according to the Japanese standard BMS. Furthermore, the results suggest that hyperspectral imaging together with classification tools such as the decision tree has the advantage of being a quick, effective and non-destructive tool for classification of marbling in beef. The study showed the potential of decision tree for classifying pixels of fat and meat based on the spectral difference at 440 nm. Meat samples evaluated traditionally obtained a high percentage of correlation with the samples obtained with the application of hyperspectral images.

Thus, the decision tree method proposed in this study, meets the requirements of the meat industry in the rapid analysis and online for classification of marbling of beef, according to the Japanese standard BMS; so, to apply HIS in the classification of the degree of marbling of beef, it could be advantageous and less costly.

Due to the provenance of the samples, it was not possible to evaluate all the marbling degrees contemplated in the standard; so, future research could involve samples from different geographical areas, different breeds and different feeding regimes.

**Conclusión general**

**Aportes, beneficios**

**Resultados**

**Recomendación**

# CONCLUSIONES

## Artículo de revisión

# CONCLUSIONES

## Artículo de revisión

- ✓ Se puede iniciar colocando la **importancia del tema** revisado.
- ✓ Luego mencionar los **principales aspectos** revisados y analizados en la revisión.
- ✓ Finalmente, ventajas, desventajas, limitaciones o **recomendaciones** de trabajos futuros en forma concreta.

# CONCLUSIONES

## Artículo de revisión

Food Eng Rev (2016) 8:306–322
DOI 10.1007/s12393-015-9137-8

REVIEW ARTICLE

**Evaluation of Food Quality and Safety with Hyperspectral Imaging (HSI)**

Raúl Siche[1] · Ricardo Vejarano[1] · Victor Aredo[1] · Lia Velasquez[1] · Erick Saldaña[2] · Roberto Quevedo[3]

### Conclusions

Importancia del tema

In the modern food industry, the requirement for adequate control of attributes such as size, shape, color and texture of foods is greater. This requirement is fulfilled by automated or by visual inspection techniques, which often can lead to human error. Furthermore, evaluation of parameters related to the food composition such as moisture content, fat, protein often requires destructive analysis that demands the use of both human and technological resources that make them unworkable in practice.

These parameters can be measured simultaneously by the HSI, which allows to obtain data on a larger number of spectral bands, making them a better source of information for assessing the external attributes and predicting the composition and spatial distribution of the various constituents within the food, besides providing speed, reliability, accuracy, reduced human error in the analysis and not be destructive.

HSI offers the advantage of evaluating samples of heterogeneous nature, by other techniques, such as simple spectroscopy, which would be limited only to the characterization of homogeneous materials, which is inefficient in a practical application that must control the entire surface of a sample.

Finally, despite presenting some disadvantages such as long time that is required for data acquisition and processing of this information, it is anticipated that the use of this technology will become indispensable in the industry, to evaluate the quality and safety of food, providing that improvements are made in terms of real-time control and safety control requirements.

Principales aspectos revisados

# 10 preguntas en la redacción de un artículo científico (AC)

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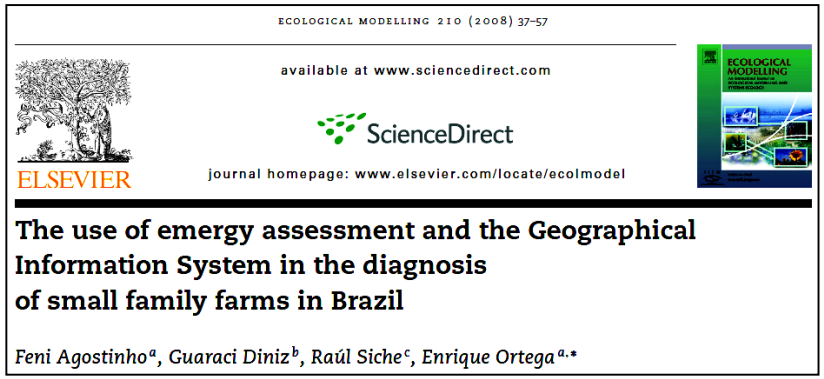
El camino de un AC hasta su publicación

# AGRADECIMIENTOS

Aquí se reconoce la ayuda de personas e instituciones que aportaron significativamente al desarrollo de la investigación.



ECOLOGICAL MODELLING 210 (2008) 37–57

available at www.sciencedirect.com

ScienceDirect

ELSEVIER

journal homepage: www.elsevier.com/locate/ecolmodel

**The use of emergy assessment and the Geographical Information System in the diagnosis of small family farms in Brazil**

*Feni Agostinho[a], Guaraci Diniz[b], Raúl Siche[c], Enrique Ortega[a,*]*

we have a better description of small family farms, improving the proposals of environmental resources usage through Best Management Practices. Duas Cachoeiras farm had a better performance in almost all emergy indicators compared to the other two farms, which use chemical agricultural production. The agroecological system revealed: (a) good efficiency in energy transformation (low value of transformity); (b) less dependency on economic resources, because only 11% of total emergy used comes from this source; (c) high sustainability, with a renewability of 59%; (d) low environmental impact (ELR = 0.69) and a greater sustainability index compared to the other systems. Thus, the expansion of agroecological produc-

**Acknowledgements**

We are grateful to Antônio Padilha for his kind help in collecting data. Thanks also to Consuelo Pereira, Otávio Cavalett, and Gabriela Vernaza for reviewing the paper. Feni Dalano Roosevelt Agostinho is grateful to CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) for the master's degree grant. This study was made possible through CAPES' financial support.

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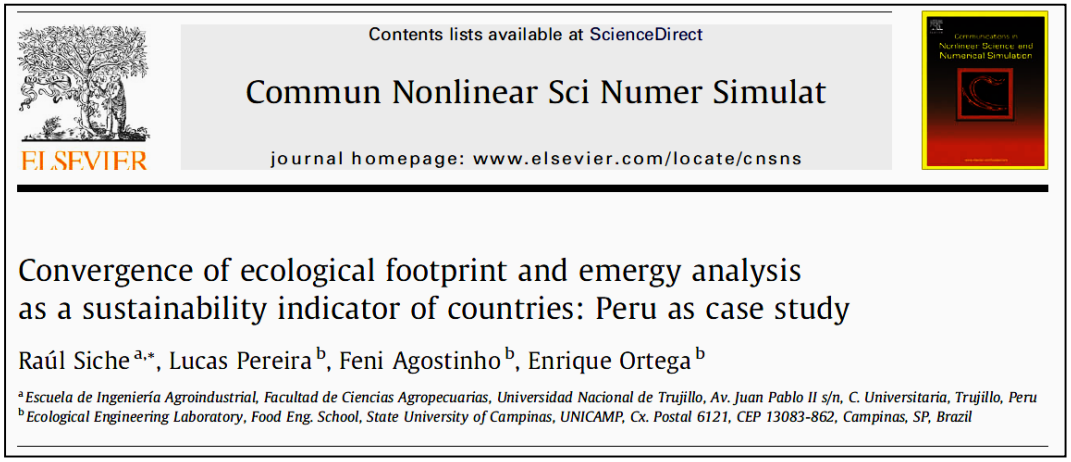

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Commun Nonlinear Sci Numer Simulat

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Convergence of ecological footprint and emergy analysis as a sustainability indicator of countries: Peru as case study

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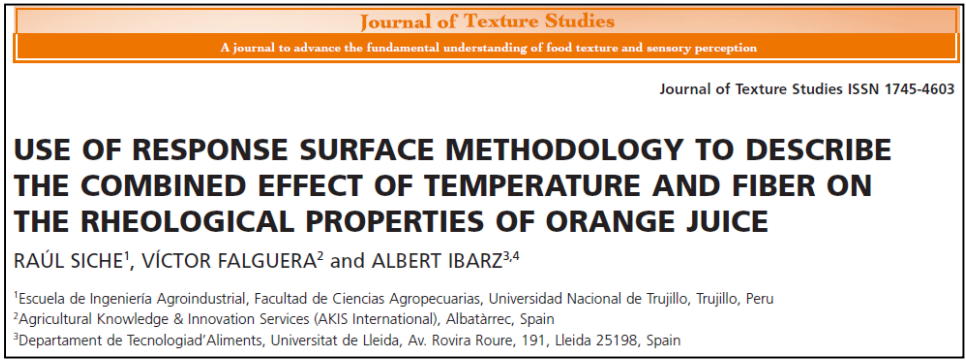

Journal of Texture Studies
A journal to advance the fundamental understanding of food texture and sensory perception

Journal of Texture Studies ISSN 1745-4603

**USE OF RESPONSE SURFACE METHODOLOGY TO DESCRIBE THE COMBINED EFFECT OF TEMPERATURE AND FIBER ON THE RHEOLOGICAL PROPERTIES OF ORANGE JUICE**

RAÚL SICHE[1], VÍCTOR FALGUERA[2] and ALBERT IBARZ[3,4]

[1]Escuela de Ingeniería Agroindustrial, Facultad de Ciencias Agropecuarias, Universidad Nacional de Trujillo, Trujillo, Peru
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[3]Departament de Tecnologiad'Aliments, Universitat de Lleida, Av. Rovira Roure, 191, Lleida 25198, Spain

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# AGRADECIMIENTOS

El nombre de la agencia que financió la investigación y el **número de la subvención** deben incluirse en esta sección.

Food Eng Rev
DOI 10.1007/s12393-015-9137-8

REVIEW ARTICLE

**Evaluation of Food Quality and Safety with Hyperspectral Imaging (HSI)**

Raúl Siche[1] · Ricardo Vejarano[1] · Victor Aredo[1] · Lia Velasquez[1] · Erick Saldaña[2] · Roberto Quevedo[3]

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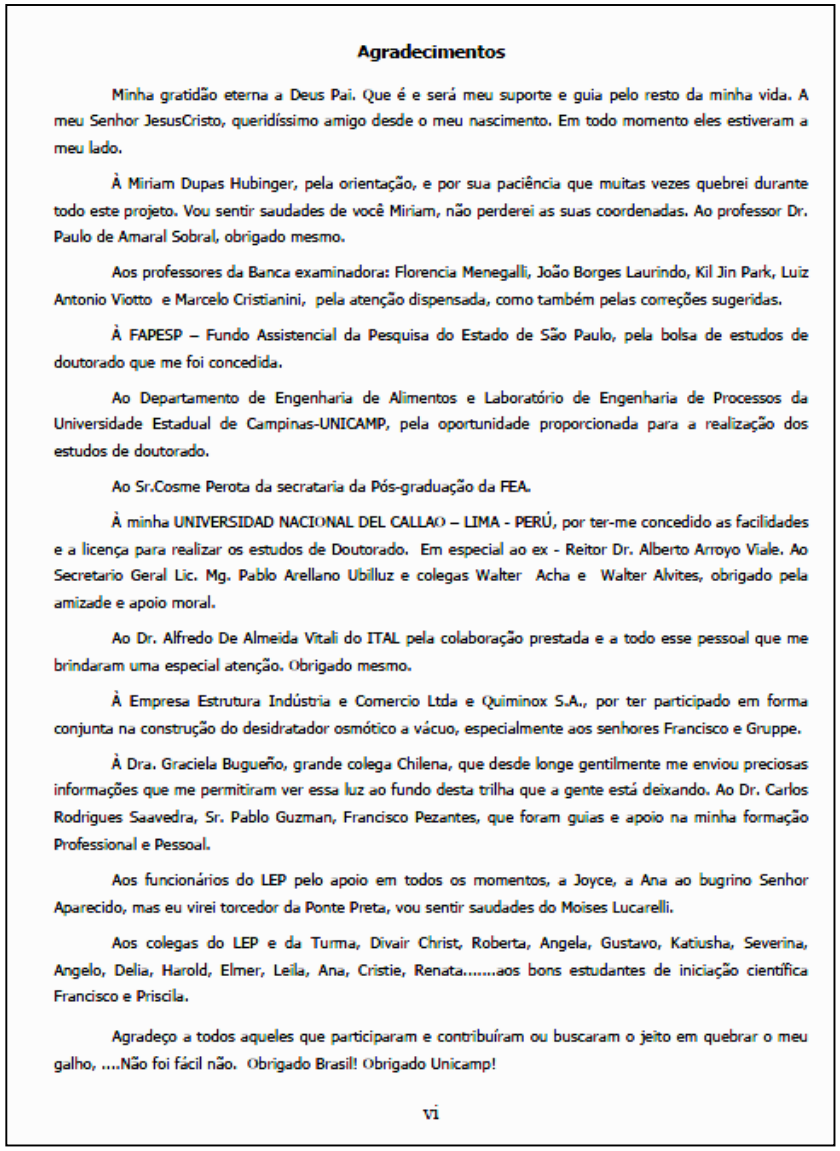

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# AGRADECIMIENTOS

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- ✓ Compañía y ayuda durante viajes al campo
- ✓ Asistencia con la preparación de tablas e ilustraciones
- ✓ Sugerencias para el desarrollo de la investigación
- ✓ Ideas para explicar los resultados
- ✓ Revisión del manuscrito
- ✓ Apoyo económico
- ✓ Traducción del texto a otro idioma.

# 10 preguntas en la redacción de un artículo científico (AC)

Importancia de publicar un AC

1. **¿Cómo redactar un buen título?**
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El camino de un AC hasta su publicación

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- ✓ La bibliografía se citará según la normativa exigida por la revista elegida o la editorial científica.
- ✓ Existen diferentes normas reconocidas internacionalmente (VANCOUVER, APA, HARVARD, ISO, etc.) y que deben ser tenidas en cuenta por el investigador, cuando sea necesario.
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# CITAS Y BIBLIOGRAFÍA

REFERENCES


Aber, J.D., Melillo, J.M., 2001. Terrestrial Ecosystems. Harcourt Science and Technology Company, Harcourt Academic Press.

Adekalu, K.O., Olorunfemi, I.A., Osunbitan, J.A., 2007. Grass mulching effect on infiltration, surface runoff and soil loss of three agricultural soils in Nigeria. Bioresour. Technol. 98, 912–917.

Agostinho, F.D.R., 2005. Uso de análise emergética e sistema de informações geográficas no estudo de pequenas propriedades agrícolas. (Use of Emergy Analysis and Geographical

Castellini, C., Bastianoni, S., Granai, C., Dal Bosco, A., Brunetti, M. 2006. Sustainability of poultry production using the emergy approach: comparison of conventional and organic rearing systems. Agricult. Ecosyst. Environ. 114, 343–350.

Coelho, O., Ortega, E., Comar, V., 2003. Balanço de Emergia do Brasil (Dados de 1996, 1989 e 1981). (Emergy balance of Brazil—Statistics of 1996, 1989 e 1981). In: Engenharia Ecológica e Agricultura Sustentável (Ecological Engineering and Sustainable Agriculture). Organizer: Enrique Ortega. Available at http://www.fea.unicamp.br/docentes/ortega/livro/index.htm, accessed on 17th January 2006.


Ulgiati and Brown, 1998), as well as theoretical studies and discussions (Herendeen, 2004; Hau and Bakshi, 2004; Brown et al., 2004; Bastianoni and Marchettini, 2000). However, there are few emergy studies that evaluate agricultural production (Ortega et al., 2002; Martin et al., 2006; Castellini et al., 2006), especially of small family farms, which have singular characteristics.

# CITAS Y BIBLIOGRAFÍA

[14] Hoekstra AY, Hung PQ. Globalization of water resources: international virtual water? Ows in relation to crop trade. Global Environ Change 2005;15:45–56.
[15] Hoekstra AY, Chapagain AK. Water footprints of nations: water use by people as a function of their consumption pattern. Water Resour Manage 2007;21(1):: 35–48.
[16] INEI – Instituto Nacional de Estadística e Informática. Peru: Compendio Estadístico; 2005. Available at http://www.inei.gob.pe/biblioinei.asp.
[17] INRENA – Instituto Nacional de Recursos Naturales. Sistema Nacional de Áreas Naturales Protegidas por el Estado. Lima, Peru; 2006. Available at http://www.inrena.gob.pe/index_inicio.htm.

(c) *Footprint calculation.* Include two important categories: soil loss and water consumption. Those categories are not accounted for in the EF-GAEZ method, neither in Zhao's approach. Water and soil are essential factors to agricultural production. In fact, water is so important to human activities that Hoekstra and Hung [14] stated that it should be considered an economic good. Nowadays, problems with water are related to its scarcity, excess and deterioration of its quality. Another major factor endangering the long term food supply is the loss of soil fertility [11]. High technology agricultural systems cause the loss of top soil at an impressive rate: corn production in Iowa, USA, implies the loss of about 20–30 tons of top soil per year per hectare; a sustainable system would tolerate a loss of only 1 ton $ha^{-1}$ $year^{-1}$ [35]. Similar situation is found in populated developing countries: 30 ton $ha^{-1}$ $year^{-1}$ in India and 40 ton $ha^{-1}$ $year^{-1}$ in China. Considering that 500 years are needed to restore 2.5 cm of top soil [35], soil loss is a serious form of biophysical capital depletion.

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e-ISSN: 2306-6741
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Las referencias bibliográficas deben estar ordenadas en forma alfabética por apellidos del primer autor. Todas las publicaciones citadas en el texto deberán estar listadas en la sección Referencias Bibliográficas, y viceversa, todas las Referencias Bibliográficas listadas deben haber sido citadas en el texto. Una indicación importante a tener en cuenta es que **mínimo el 75% de las referencias bibliográficas deben ser artículos científicos y mínimo el 50% de los últimos 5 años**. Minimizar en lo posible el uso de libros y/o páginas web.

**Ejemplos:**

**Journal o revista científica**

Velásquez, L.; Cruz-Tirado, J.P.; Siche, R.; Quevedo, R. 2017. An application based on the decision tree to classify the marbling of beef by hyperspectral imaging. Meat Science 133: 43-50.

**Libro**

Fellows, P. 2007. Tecnología del procesado de los alimentos: Principios y práctica. 2da Edición. Editorial Acribia S.A. Zaragoza, España. 746 pp.

**Capítulo de libro**

Siche, R.; Carranza, J. 2016. Caso Espárrago Peruano. En: Arias-Vargas, F. (Comp.). Casos Empresariales en Agronegocios Perú-Colombia. Serie Lasallista Investigación y Ciencia. Colombia. Pp. 53-92.

**Actas de conferencia o Conference Proceedings**

Cruz, G.; Guzman, Y.; Mayorga, A.; Vejarano, R.; Tapia-Blácido, D.R.; Cruz-Tirado, J.P.; Siche, R. 2016. Influence of fiber size on the mechanical and physical properties of foam made from sweet potato starch. En Proceedings of the International Agroindustrial Engineering Conference, México, 17-20 oct, 2016.

**Tesis**

Siche, R. 2007. Avaliação ecológica-termodinâmica e econômica de nações: o peru como estudo de caso. Tesis de doctorado, Universidad Estadual de Campinas, Sao Paulo. Brasil. 377 pp.

**Página Web**

O'Brien, T.; Díaz, A. 2004. El ejemplo del espárrago Peruano. Inter-American Institute for Cooperation on Agriculture – IICA y Comisión para la Promoción de Exportaciones – PROMPEX. Disponible en: http://infoagro.net/shared/docs/a3/esparrago_peru.pdf.

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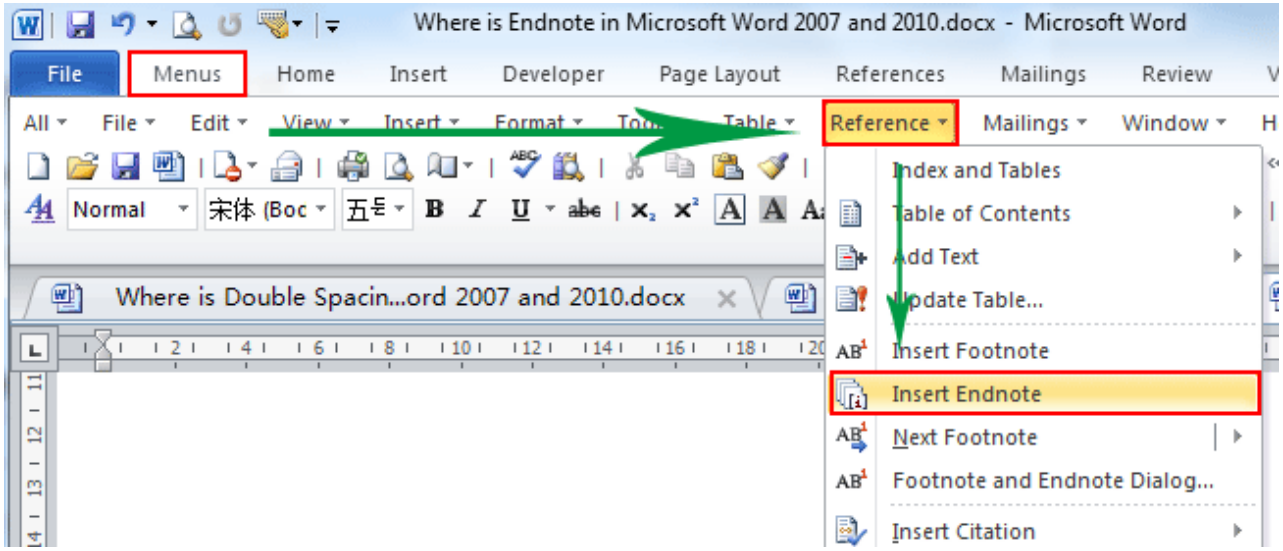


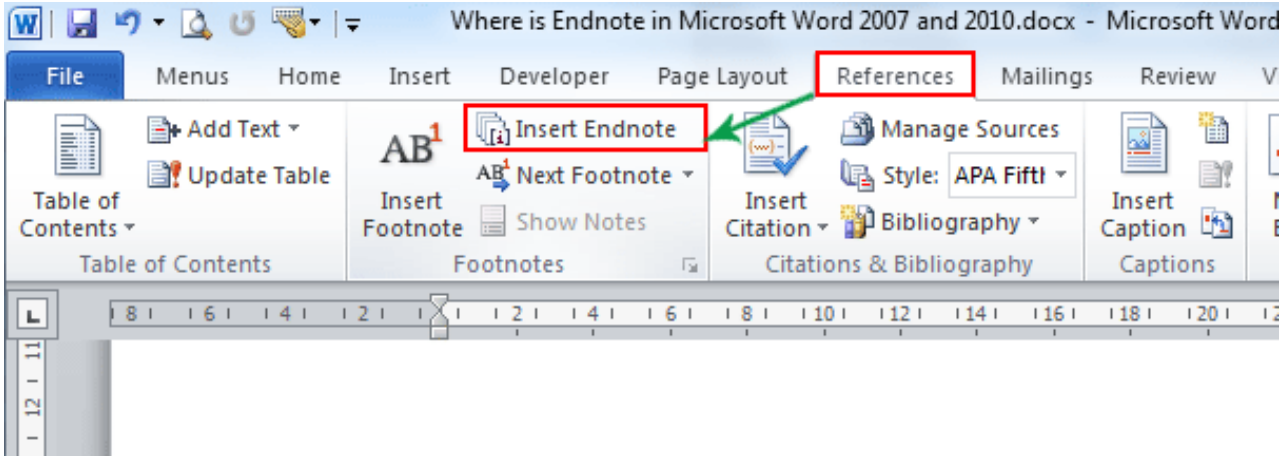

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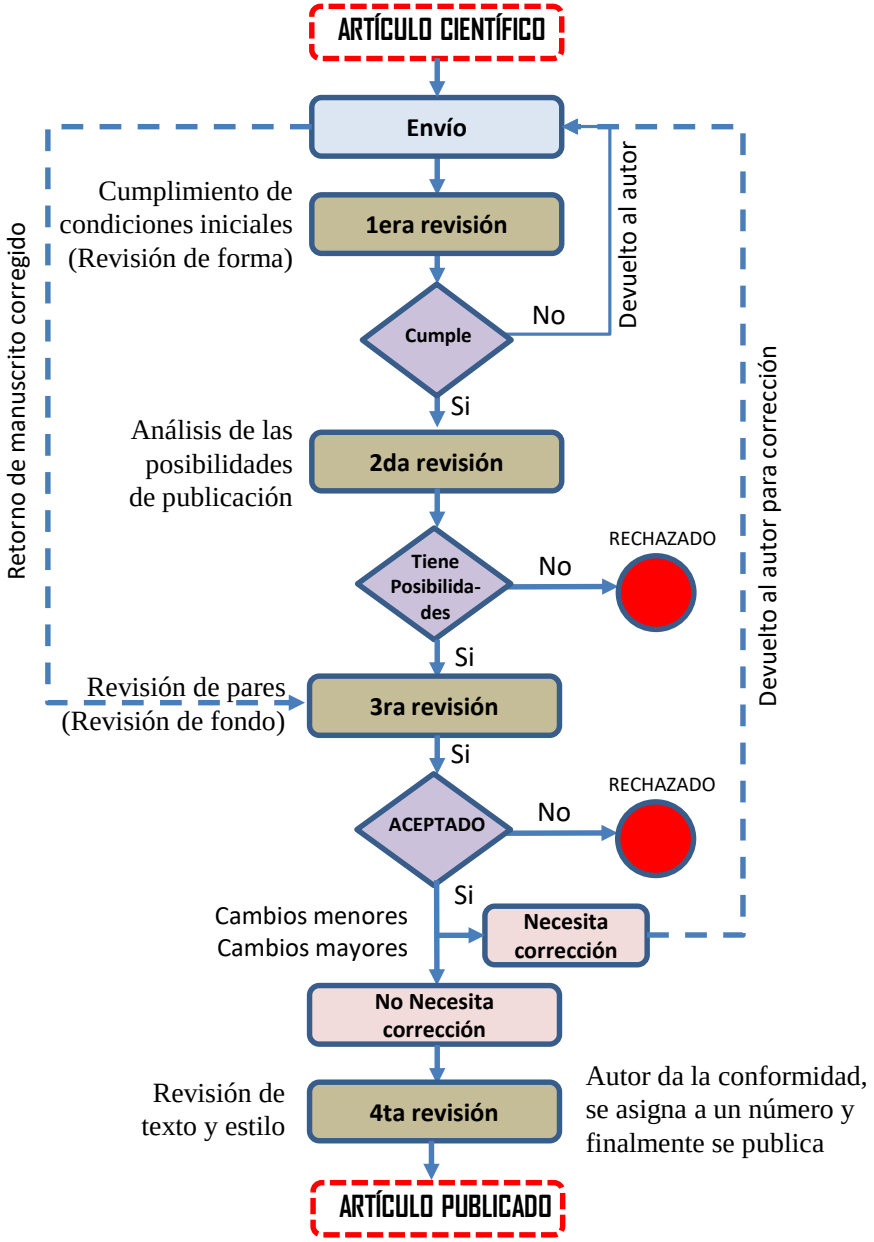

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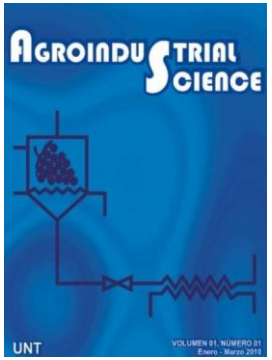


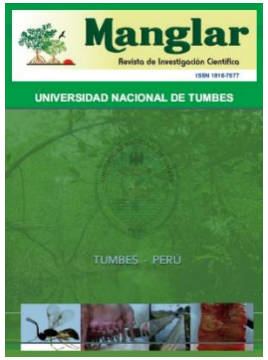


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Editor
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