CHAPTER 1: INTRODUCTION

It is unquestionable that English is the international language of scientific and technical communication (Bathia, 1993; Swales, 1990). The academic community around the world disseminates knowledge in this language, mostly by means of written pieces of work in specific genres, after a long and complex process through which these publications come to life as final products (Lindeberg, 2004; Swales, 2004). In this framework, Hyland (2006) highlights the current situation of academics, particularly the linguistic difficulties of its young members from the moment they enter higher education. He states that students need to tackle new roles and get involved in knowledge in new ways as well. These doings involve communication practices which differ among disciplines; this means that the construction of knowledge also varies. In this sense, Hyland (2000) states that there are differences among disciplines and that these differences are mostly related to "how" they (the students) write rather than "what" they write (p. 3).

More specifically, in the postgraduate stage of the academic career, the prominent role of English for the international dissemination of scientific findings places both this language and the English speaking members of its discourse community in an undeniable position of power (Hyland, 2000; Saville-Troike, 2003) in relation to those scientists whose mother tongue (L1) is not English. Indeed, scientists in the fields of Ethnography of Communication and Applied Linguistics claim that, in order to belong to a discourse community, their members should know and master the linguistic and rhetorical markers of their own specific science community, i.e., they should have communicative competence both for reading and for disseminating their own scientific production. This pressure on young researchers is clearly expressed by Cargill and O'Connor (2006), who state that "getting published in the peer-reviewed international literature is a goal that is becoming more important for researchers worldwide from an early stage of their career" (p. 208).

Specifically related to the present study, this communicative competence involves, among various skills, that of decoding titles when doing bibliographical searches, as well as writing titles effectively. The effective writing of this tiny but

crucial part of the scientific production marks the difference between the article as a whole being read and cited and its being discarded altogether by the target reader.

This study centers its attention on the analysis of titles of two central genres of the scientists' daily doings, the research article (RA) and the review article (RVA), from a specific area of knowledge, Animal Production. Hyland (2000) and Dudley-Evans (1984) state that narrow and limited research may provide answers to the need of focusing in depth on certain aspects and genres so as to draw conclusions useful for pedagogical purposes.

1.1. CONTEXT AND ISSUE

In this section I locate the current study geographically and institutionally, and I also describe the difficulties that junior researches encounter when facing the task of searching the literature and then engaging in the writing process. I finally delineate the research focus, as well as the motivations and the rationale behind its selection.

My work place, Universidad Nacional del Centro de la Provincia de Buenos Aires (UNICEN), Argentina, houses an Agronomy School (Facultad de Agronomía, www.faa.unicen.edu.ar) in Azul city and a Veterinary Sciences School (Facultad de Ciencias Veterinarias, www.vet.unicen.edu.ar) in Tandil city, among other schools. Apart from their teaching activities, the technical-scientific undertakings of both schools, that is, research, development, human resources and extension, among others, strongly interact with the geographical presence of both Instituto Nacional de Tecnología Agropecuaria (INTA) and the Agronomy School of Mar del Plata city (Facultad de Agronomía de la Universidad Nacional de Mar del Plata, www.faa.unmdp.edu.ar). Among the agricultural endeavors undertaken by UNICEN, Animal Production stands as one of the most relevant, given the economic regional impact of the products involved, the leading ones being beef and dairy cattle.

This scientific-technological-economic circuit involves a great number of researchers who frequently suffer situations of linguistic inequality related to writing in English as a foreign language. These situations manifest in different ways that range from feeling frustrated when getting their manuscripts back with strong observations related to English language issues (Belcher, 2007; Martínez, 2003) to behaving as outsiders in the international English language circuit altogether. This situation stems

from the very nature of the language of science as junior researchers need to struggle not only with unfamiliar genres, but also with a process of negotiation and construction of texts, which has to be done in a foreign language. As Cargill, O'Connor, and Yongyan (2012) state, "[t]here is an acute need for graduate students to develop the required language skills alongside their scientific expertise" (p. 60). The assistance that they may get in our country is, in general, of two kinds: occasional workshops on academic writing, some of which do not even focus on their discipline specific writing features, or else, some advice from their research directors, who, although they are experts in their fields of study, they lack expertise in English for Specific Academic Purposes (ESAP) pedagogy. In my context in particular, namely UNICEN, there is scant availability of EFL teachers with expertise in academic writing who use discipline-specific, expert-written-and-published models of scientific language in their EAP writing programs. Indeed, there is a lack of programs of this type that could be of support for apprenticing students into academic discourses, so as to contribute to their participation in their target discourse community.

Specifically, the present study was triggered by concerns and questions arising from my teaching experience in the undergraduate courses of Academic English Reading Comprehension for Veterinary Medicine and Food Technology majors, as well as the postgraduate workshops in Academic Writing for a wide array of disciplines from Human and Social Sciences, Hard Sciences and Natural Sciences. Undergraduate and postgraduate students, teachers and researchers with an elementary or pre intermediate level of proficiency in English show the same kind of difficulties in science for both reading and for writing. Thus, I assumed that if I wanted to assist my students efficiently in their linguistic efforts, I should be able to show them the features of the language of their specific fields. In order to achieve this objective, it was necessary to conduct a research work about their areas of study using international journals. After consulting expert scientists in different areas of knowledge, the decision was that Animal Production would be the sub discipline to be studied, because of its relation with important majors of our institution, particularly Veterinary Medicine, Agronomy, Zootechnics, and to a lesser extent, Environmental Diagnosis and Management, Geography and Systems Engineering, and because of the importance of the discipline selected in terms of the geographical location of my work place. I also decided to work

with titles since they are an essential part of the texts studied here, and because of their relevance in the reading and writing of the RA.

The rationale for the selection of such a specific discipline, Animal Production, is in line with studies in English for Specific Purposes (ESP) which stress the need for researching sub disciplines, since variety seems to be the rule in an area, rather than the exception. Also, there seems to be no clear-cut guidelines for junior researchers to write their papers (Bazerman, 1988; Dudley-Evans, 1984; Holmes, 1997; Sisó, 2009; Soler, 2007) or for EFL teachers interested in academic writing.

The selection of titles as the object of study of this thesis arises from the added value that titles have in the scientific labor (Cianflone, 2010; Day, 1998) since they constitute the means of access to a text in bibliographic searches and the first point of contact between the scientist and the text (Haggan, 2004; Soler, 2007). Thus, well-written titles, that could serve as models to junior researchers, are of easy indexation (Busch-Lauer, 2000; Hartley, 2005; Moore, 2010) and have a precision that allows researchers to effectively find those works that relate to their own scientific niche. Moreover, these titles inform the reader about the topic and audience addressed in a succinct, precise, clear and relevant manner, since it is at this step of the reading-searching process that the scientist decides whether to discard the article altogether or continue reading it (Bazerman, 1985; Gesuato, 2008; Hyland, 2002b; Soler, 2007; Swales & Feak, 1994).

These title features require the mastering of specific linguistic and pragmatic skills, for decoding as well as encoding them. Thus, EFL teachers of academic reading and writing programs should pay special attention to these features and the skills required to master them, since researchers spend a substantial part of their working time reading and writing science. In fact, “a scientist today reads an average of 97 articles, 204 abstracts, and a staggering 1142 titles every year” (Mabe & Armin 2002, as cited in Ball, 2009).

In this context and with these motivations, the present work aims to examine some linguistic and pragmatic features of titles drawn from internationally prestigious journals in English in the field of Animal Production, specifically focusing on the two key academic genres for researchers: RA and RVA.

It is my endeavor to provide, through the analysis undertaken in this thesis, linguistic tools useful to junior researchers that may empower them to understand the use of language in order to efficiently decode academic titles in their bibliographic searches and prepare them for eventually writing their own titles. Moreover, the insights gained from my findings on titles might be a useful starting point for the development of awareness of how the English scientific language works.

1.2. HYPOTHESIS AND OBJECTIVES

The focus of this thesis is on titles of RA and RVA in terms of structures and pragmatic function, the former realizing the latter. An awareness of these would assist junior researchers in achieving their particular purposes when reading and writing. Thus, in this section I detail the hypothesis and subsequent research objectives, both general and specific, which frame the present study.

Assuming that academic writing substantially varies according to discipline and thematic area or sub discipline, as well as among genres of the same discipline and thematic area (Holmes, 1997; Hyland, 2000; 2008; Jalilifar, 2010; Sisó, 2009), and considering the theoretical background which will be expounded in Chapter 2, the hypothesis underlying this study is that the titles of both genres (RA and RVA) will present structures with distinctive features. I expect that their identification will reveal, on the one hand, particular features of the language of titles from different scientific genres, and on the other hand, the pragmatic functions that accord to the purposes of scientists in Animal Production. It is worth bearing in mind that these specific purposes depend, among other things, on the epistemology of the area, which makes the linguistic study of sub disciplines so important.

1.2.1. General Objective:

The overall aim of this thesis is to identify features, both linguistic and pragmatic, of RA and RVA titles in the field of Animal Production.

1.2.2. Specific Objectives:

This general aim is broken down into a number of more specific aims, namely:

1. Identify lexical features of RA titles of journals in the field of Animal Production.

2. Identify lexical features of RVA titles of journals in the field of Animal Production.

3. Compare lexical features of RA titles and RVA titles of Animal Production.

4. Identify structural features of RA titles.

5. Identify structural features of RVA titles.

6. Compare the structural features of RA titles and RVA titles

7. Analyze the relationship between the structural and lexical features and the pragmatic purpose of titles of RAs.

8. Analyze the relationship between the structural and lexical features and the pragmatic purpose of titles of RVAs.

9. Analyze how the relationship between the structural and lexical features and the pragmatic purpose of titles of RAs realize the features of what is considered a well-written title.

10. Analyze how the relationship between the structural and lexical features and the pragmatic purpose of titles of RVAs realize the features of what is considered a well-written title.

11. Compare the relationship between the structural and lexical features and pragmatic purpose of RAs and RVA titles.

I expect that my findings may be useful to produce guidelines for students as novice academic researchers of the field, willing to search titles and find, in an efficient and critical manner, the literature that best suits their research interests, as well as write their own precise, informative and easy-to-index titles.

CHAPTER 2: THEORETICAL BACKGROUND AND STATE OF THE ART

This chapter presents the theoretical ideas that support the analysis carried out in this study (2.1) and the contributory works related to the focus of this thesis (2.2).

2. 1. Theoretical background

The theoretical framework used in the present thesis builds on theories of Applied Linguistics: English for Specific Purposes (ESP) (2.1.1), Genre Analysis (2.1.2), and Corpus-Based Studies (2.1.3). For some aspects of the present work, the study also draws on the grammatical information provided by reference grammars (2.1.4). The study focuses on two genres, the RA and the RVA, which are described below (2.1.5).

2.1.1. English for Specific Purposes

Within Language for Specific Purposes (LSP), the approach known as ESP centers its attention on the study and teaching of specialized varieties of English, mostly to non-native English speakers, and specifically in academic and professional settings. In the words of Dudley-Evans and St. Johns (1991), “ESP requires the careful research and design of pedagogical materials and activities for an identifiable group of adult learners within a specific learning context” (p. 298).

Dudley-Evans and St. Johns (1991) cite Strevens (1988) to pin point the key features defining ESP. Strevens makes the distinction between absolute and variable characteristics of ESP. The first set involves teaching designed to meet learners’ specified needs, based on topics related to their particular disciplines, and centered on the language appropriate to those disciplines. The second set of characteristics involves teaching that may be restricted to a particular language skill as needed by the discipline, such as reading only, and not using any particular methodology. In this light, it can be claimed that ESP teaching is relevant to the learner, cost-effective, and time saving.

Thus, we see that the three most prominent features essential to the practice of specific-purpose teaching are needs assessment, content-based teaching methods, and content-area informed instructors (Hyland, 2000; Selinker, 1979).

Specifically, English for Specific Purposes is an umbrella term for more specialized areas as the following:

- English for Occupational / Vocational / Professional Purposes (EOP, EVP, EPP), for example, English for doctors, airline pilots, and hotel staff, either before they are students or while they are students as well as when they are already professionals;
- English for Academic Purposes (EAP), either before or while they are students in the academy (undergraduate, graduate, post graduate), and which can be further specialized into:
    - English for General Academic Purposes (EGAP), focusing on skills for undergraduate students, such as listening and note-taking, academic writing, reference skills, seminars and discussions;
    - English for Specific Academic Purposes (ESAP), such as English for Science and Technology, and English for Research Publication Purposes (ERPP) (Dudley-Evans & St John, 1998).

In this frame, the present study is associated to English for Specific Academic Purposes, or, as is known today, simply English for Academic Purposes (EAP). The study centers its attention on titles of RAs and RVAs, which may be read or written by graduate students through two of the most important activities in the research domain: doing bibliographical searches and writing for research publication purposes in an international journal.

2.1.2. Genre Analysis

ESP came to existence in the 1960s, but only in the 1980s did ESP researchers begin using genre analysis for research and pedagogical purposes. It was Tarone, Dwyer, Gillette, and Icke (1981) who used the term “genre” for the first time in the context of English for Specific Purposes; indeed, the term was not much used in Linguistics, but contributions made by the ESP tradition to the evolution of genre studies stress three important aspects of genre: it is a communicative event with specific goals; it is schematically structured, and it varies across registers and styles (Swales, 1990). Indeed, it was in the 1990s that Swales’ pioneering work *Genre Analysis: English in Academic and Research Settings*, brought genre analysis into ESP research

and teaching through theory and methodology. At this point, it is worth noting that, while genres in literary discourse such as a tragedy or a comedy vary in form, genres in non-literary discourse, such as the RA and the RVA, vary in communicative purpose (Dudley-Evans, 1994).

The great interest of the 80s in studying genre as a framework for analyzing non-literary discourses gave rise to the theory of Genre Analysis, which developed and took on different paths around the world. Indeed, three main theories or schools arose, namely, English for Specific Purposes (ESP) (Bathia, 1993; Flowerdew, 1993; Hopkins & Dudley-Evans, 1988; Swales, 1990; Tarone et al., 1981), North American New Rhetoric studies (Bazerman, 1988; Devitt, 1993; Freedman & Medway, 1994; Gosden, 1992; Miller, 1984), and Systemic-Functional Linguistics (SFL) in Australia (Halliday, 1985/1994; Halliday & Hasan, 1989; Martin, 1990; 1992; Mathiessen, 1992). Each of these proposes a different concept of genre, object of study, context and institutional framework, albeit with points of contact in some aspects. The literature on genre may be complex to understand; Hyon (1996), however, sheds light on the topic by providing an exhaustive comparison of the three traditions in her state-of-the-art article, which I briefly delineate below.

In terms of focus of analysis, ESP is interested in a linguistic analysis of genre in its oral and written forms as required by non-native speakers in both academic and professional settings. In this tradition, genre is considered a communicative event which features a specific form and a specific communicative purpose, form referring to structure, style, content, and target audience. Of these two aspects, however, researchers have focused more on the form, in particular, on move analysis, revealing overall patterns of organization of certain genres, particularly research articles. They have also focused on some grammatical aspects such as verb tense and hedges. New Rhetoric, on the other hand, centers its interest on the situational contexts where genres take place for L1 teaching, specifically, on the social purpose of the genres used in those situations, by means of ethnographic studies, that is, by observing how people learn to write in their natural contexts. Finally, the Australian theories developed under the umbrella of SFL, are interested in language and its relationship with society in terms of the function it performs. Out of all the possible social facets related to a communicative situation, three elements, namely, field, tenor, and mode, impact in a direct and significant way on the kind of language produced in that situation (Halliday, 1985/1994), field being the

activity taking place at the moment communication is occurring, tenor being the relationship of the participants in the communication event, and mode being the channel of communication used in the event, all of which give form to a particular register. These three concepts, together with register, are key to understand this theory of language. Thus, language is shaped according to three specific features of the society where it is inserted. Within the systemic framework, it was Martin who centered his attention on genre rather than register. SFL theory resembles ESP in that researchers analyze linguistic features of several genres, but differs greatly from both ESP and New Rhetoric in that SFL researchers initially focused on primary and secondary school as well as on non-professional genres. In the 90s, however, the interest and focus eventually disseminated to other fields, one of them being scientific language (Halliday, 1997; Martin & Veel, 1998).

In terms of teaching context, ESP researchers have centered on English for Academic Purposes (EAP) and English for Professional Communication (EPC) teaching contexts. ESP researchers propose that their insights are useful to non-native speakers of English for mastering the functions and linguistic features of the texts they need to read and write in their professions. New Rhetoric researchers, by contrast, have focused on making young university students aware of the social functions of the genres in the social contexts where the genres are used. When the norms and goals of that community are understood and managed, it is possible to make the right rhetorical choices. This has permeated the ESP tradition which is paying more attention to the contextual issues underlying genre analysis. Finally, SFL has centered on primary and secondary education, as well as on adult migrant English education and work training. A marked ideology underlies the SFL tradition, since its aim is to empower non-native English speakers for success in an English speaking society (Hyon, 1996).

For this study, I characterize genre drawing on the ESP tradition and the Sydney school. In the words of Swales, the most prominent representative of the ESP tradition, genre is

> … a class of communicative events, the members of which share some set of communicative purposes. These purposes are recognized by the expert members of the parent discourse community, and thereby constitute the rationale for the genre. This rationale shapes the schematic structure of the discourse and influences and constrains choice of content and style. (Swales, 1990, p. 58)

In the words of Martin and Rose (2003), both representatives of SFL, genre is “a staged, goal-oriented social process. Social because we participate in genres with other people, goal-oriented because we use genres to get things done, staged because it usually takes us a few steps to reach our goals” (pp. 7-8). Thus, both schools approach the learning of genres through the analysis of their schematic structure, which stems from the need to achieve certain communicative objectives within a discourse community.

The two approaches mentioned above address the immediate and ultimate concerns related to the difficulties undergone by junior researchers in their communicative efforts. These concerns gave rise to this study: while focusing on titles, I consider that the insights gained from the analysis will help me to assist junior researchers in the achievement of efficient decoding of titles in bibliographical searches and in the construction of efficient titles when writing.

In the framework of ESP, I center my attention on Genre Analysis to arrive at the concept of genre underlying the present study. According to Hyland (2000), knowledge of a genre shared by a discourse community is complex. It is integral to the scientist’s schemata or knowledge of the world. Although genres take shape from repetitive communicative situations, thus assisting in the stabilization of patterns that are necessary for discourse community members, they should not be taken as static elements. In fact, they undergo a constant evolution in face of the innovative answers that members of the academic community must continuously give to the strong demands that their disciplinary areas exert upon them. What scientists with a common knowledge of genre share, then, is a name, roles, formal text features, text content, communicative purposes, contexts, register, and awareness of intertextuality. Junior researchers should be pedagogically assisted in getting aware of what is involved in the process of mastering the genres they need so as to “belong” to their scientific community.

2.1 2.1. Systemic Functional Linguistics (SFL): Nominalization and Gerunds

This study also draws on SFL for title analysis. It specifically focuses on nominalization, a key linguistic feature realizing written text and, in particular, scientific

written text. This aspect pertains to the textual function as realized by mode, which is one of the three functions that conforms a register, as mentioned above.

Nominalization is one relevant feature of scientific language. In order to understand this concept, the first thing that should be considered is that the language of science is born from a transformation that the commonsense, everyday language, technically known as “congruent” (Halliday, 1997), undergoes to become an efficient tool for expressing in language the scientific experience. Halliday (1997) explains that human experience is expressed in language by means of figures; a figure is a semantic unit revolving around an event, something that happens, a process. Together with the event in the figure, there are things, participants, entities that participate in different ways in the process, as well as circumstances such as when, where and why the process occurs.

Nominalization, a pattern widely used by the language of science, involves turning almost every element of a figure into an entity (noun). This means that the whole experience is transformed from a process into a Thing, and the rest of the elements expand that Thing or entity by means of circumstances and other entities. If we consider the English language, that expansion may take place to the left or the right of the central entity or Thing (noun); to the left we would have classifiers (related to class), epithets (related to qualities), numeratives (related to quantity or order) and deictics (related to a particular point of reference). Then to the right of the central Thing or entity we may find phrases or clauses which add specification to the central entity; it is here that we may find circumstantial elements or other entities.

At this point, I will follow Halliday’s (1997) exemplified steps of that transformation with an example of my own corpus. Thus, let’s consider an event in Animal Production, that of analyzing something using certain parameters. Through grammar, the event is construed as a figure: a process (verb), ‘analyze’, and three participating objects (nouns), ‘scientists’, ‘swine’, ‘breeds’. The last participating entity could combine with a classifier (adjective), ‘Canadian’, and a numerative (adjective) ‘four’. Through a clause, the grammar construes this figure as ‘The scientists analyzed swine of four breeds that are originally from Canada’ in congruent language, that is, in commonsense, daily language. This figure can combine with another in a sequence, and we would have a clause nexus; for example, we might add the process ‘use’ and the

entity ‘data’ and the classifier ‘pedigree’ to construe the figure “The scientists used pedigree data’. Combined, both figures would be expressed by grammar as the clause nexus ‘The scientists used pedigree data and analyzed swine of four breeds that are originally from Canada’. In this way, grammar has transformed human experience into meaning. The pattern expressed in the example is the congruent one for expressing the relationship between the different elements of the figures. The interesting point here is that grammar can construe experience in this way, but it can also deconstrue it and construe it in a completely different way or pattern, which is highly exploited in the language of science: nominalization. Going back to the example, then, we would shift from the congruent form ‘The scientists used pedigree data and analyzed swine of four breeds that are originally from Canada’ to the nominalized form: ‘Analysis of genetic diversity in four Canadian swine breeds using pedigree data’ (case 108 of my corpus). A shift has taken place from a 16-word title (longer and lighter, as it were, but complex in structure) to a 12-word title (shorter and denser, but structurally much less complex). That is, grammar shifts from a clausal to a nominal form of construction. This shift is what Halliday calls “grammatical metaphor”, in which a structure -a clause- is replaced by another -a noun phrase- much in the same way that in a metaphor, a word is replaced by another (Halliday, 1997).

A point to consider is gerunds, as they occur frequently in titles. In their study of medical RA titles, Wang and Bai (2007) take gerunds as pertaining to a category different from that of the Noun Phrase. In the same line, Jalilifar (2010), in her study of thesis and article titles in Applied Linguistics, takes gerunds as a category in itself and labels it “verbal phrase” (VP). However, gerunds are used in this study, as observed by Halliday (1998) and Alexiadou (2001). The first author considers -ing words that come from a process (verb) to be a “thing” (and thus, a noun), thus transformed in their metaphoric reconstrual, which is typical of the language of science: Halliday provides the following example:

> Clause: “The driver <u>was driving</u> the bus too fast down the hill”
> (process: material)
> Nominal Group: “The driver’s over rapid downhill <u>driving</u> of the bus”
> (thing)
> (Halliday, 1998b, p. 57)

In the same line, the second author, Alexiadou (2001), observes that:

> In the literature a certain amount of consensus has emerged that gerunds (a) are NPs …. Evidence that English gerunds are noun phrases comes from the fact that they are able to appear in a number of positions typical for noun phrases. For instance, they may appear as objects of prepositions or subjects of sentences. (Alexiadou, p. 2)

Although the –ing word refers to an action, it has been turned from a verb into a noun, a shifting process leading to what characterizes the language of science: nominalization. Indeed, -ing nominalizations have been shown to differ in the aspectual point of view from –tion nominal phrases in that the former involves an imperfective, progressive idea, while the latter emphasizes the idea of result (Alexiadou, 2001).

2.1.3. Corpus-based studies

In this section, I highlight the relevance of corpus-based research, offer a definition of corpus upon which this study is based, provide basic principles for designing a corpus, and explain what is involved in doing corpus-based analysis.

The rapid development of information and communication technologies (ICTs) boosted the growing interest in corpus-based linguistic studies, especially those centered in ESP. Sinclair (2004a), one of the most prominent authors in the field, defines a corpus as "a collection of pieces of language text in electronic form, selected according to external criteria to represent, as far as possible, a language or language variety as a source of data for linguistic research" (p. 19). More specifically then, corpus is taken here as a collection of real texts of a specific academic genre, selected to determine the common linguistic and pragmatic features of a certain language.

Sinclair (2004a) states that the construction of a corpus should be based on documents that people write and read; this construction could be accomplished by taking into account audience and circulation size. This means that a corpus should be constructed on the basis of external criteria, i.e., the communicative function of the texts gathered, not the language those texts contain.

In his *Corpus and Text - Basic Principles*, Sinclair (2004a) states that, when constructing a corpus, it should be borne in mind that the corpus will never have the same characteristics of the language as a whole, regardless of the size and care in its

design. Thus, when it comes to representativeness, a corpus should strive to be as representative as possible of the language the researcher intends to sample.

When a corpus has been assembled from published data, this adds to its representativeness since the articles have undergone a process of revision and acceptance by the gatekeepers of the discipline before publication; these articles constitute accredited examples of academic interactions (Hyland, 2000), which makes irrelevant the question of whether the authors are native English speakers (Lindeberg, 2004).

The representativeness of the corpus may be debatable in terms of size as to the extent to which the findings may be regarded as valid and generalizable. In this respect and in line with Sinclair (2004b) about the findings of works with corpus, my aim is to show how the structures of titles from the discipline and genres selected may evidence general patterns and trends, not necessarily models.

Sinclair (2004a) also states that common criteria for selecting the text that will form the corpus are six, namely mode (writing, speech, electronic), type of text (if written: a journal, a book), domain (academic, popular), location (UK, Australia), and date of the texts. Whatever the criteria chosen for the construction of a corpus, they should be selected with great care, since representativeness and trust on the corpus built will depend on this.

Flowerdew (2005) considers that studies having corpora relatively small and specific in terms of discipline are valid, especially when the discipline under study is related to the analyst's working environment, for two important reasons: first, the analyst knows the socio-cultural context because she or he works in that context as analyst-teacher; second, she or he may recur to discipline expert informants who can validate findings and provide interesting and relevant insights. This is the case of the present study.

Corpus analysis involves empirical work: it consists of searching for evidence to support trends and patterns that are valid and reliable (Meyer, 2006); this evidence is taken from samples with the following characteristics:

1. realistic, showing language in real use;

> 2. rich, providing more (and more diversified) information than dictionaries or reference grammars can;
> 3. illustrative, providing actual patterns of use instead of abstract explanations;
> 4. up-to-date, revealing trends in language use and evidence for short-term historical change. (Braun, 2005, p. 48)

I am aware that, as Sinclair (2004b) has observed, a corpus cannot possibly be perfect; claims about guarantee of representatives in terms of coverage and sampling should not be made. One can only provide detailed criteria for design and construction in such a way that one can be "approximately right" and not "precisely wrong" (Sinclair, 2004b, p.73).

In the present work, the decision of selecting titles of on-line published articles is based on the fact that the availability of the corpus in electronic form provides a simple, time saving sample for replicability for checking findings against publications from other periods or journals (Hyland, 2000).

Through the intensive study of a number of texts, it is possible to elucidate to what extent writing is the result of options that depend on certain situations, as well as how the writers select the patterns that help them better negotiate their purposes in their interactions with the reader (Hyland, 2000). The specialized corpus gathered for the present study, which is described in the Chapter Methods, is a sample of typical titles from internationally prominent journals, and its analysis intends to elucidate the rationale behind scientists' choices.

2.1.4. Reference Grammars

While Systemic Functional Linguistics is interested in language and its relationship with society as to the function it performs there, Reference Grammars view the language mainly in terms of its structure. From the grammatical point of view, the sentence is the maximal unit of analysis, considering also smaller units of language in its analysis. From the semantic and pragmatic points of view, the grammar considers a larger unit for analysis, a text, which, according to Quirk, Greenbaum, Leech and Svartvik (1985), is seen as "a stretch of language which seems appropriately coherent in actual use" (p. 1423). I will briefly explore here certain outstanding general features.

A sentence may be seen as involving five parts called elements, namely, subject, verb, complement, object, and adverbial. At the same time, the structures realizing those elements are composed of units called parts of speech. These parts of speech are classified into closed-system items and open-class items. Closed-system items are articles, demonstratives, pronouns, prepositions, conjunctions and interjections; they cannot be extended by the creation of additional members, are reciprocally exclusive, and reciprocally defining. Open-class items are nouns, adjectives, adverbs, and verbs; in each class, they have the same grammatical properties and structural possibilities, and they are indefinitely extendable (Quirk & Greenbaum, 1979).

An interesting aspect to consider in this study is the distinction between stative and dynamic open-class items. Broadly speaking, nouns and adjectives are stative, in the sense that nouns refer to entities that are regarded as stable, whether they are concrete or physical, or abstract. Verbs and adverbs, on the other hand, are dynamic, most clearly verbs which can show tense and aspect, and indicate action, activity or temporary or changing conditions (Quirk & Greenbaum, 1979). Thus, we can use language structures in order to describe a stative world that facilitates description and analysis, as in science; noun phrases are those structures, which may be indeterminately long and complex, with a noun as head, preceded by other words such as an article, an adjective, or another noun, and followed by a prepositional phrase or a clause. This is in close relationship with nominalization, which was discussed in this study from the SFL point of view.

2.1.5. The Research Article and the Review Article

In this section, a description is offered of the types of RAs and RVAs that are considered in this study; also, the importance of both genres for the academic environment is highlighted; finally, a definition is offered of both genres from the point of view of the core theoretical framework of this thesis.

A research article is a primary source, i.e., it reports the methods and results of an original study carried out by an author or group of authors in which raw data have been collected and analyzed by the author or authors, and conclusions have been drawn from the results of the analysis (http://apus.libanswers.com/a.php?qid=153014). The RVA is an article longer than the RA, dealing with the state of the art, presenting a historical

perspective, or discussing a current scientific issue in a specific disciplinary area, written by a senior researcher of prominent career who has been invited by the editorial board to undertake the writing endeavor (Noguchi, 2006).

The study here analyses empirical research articles, i.e., those typically having the structure Introduction-Method-Results-Discussion (IMRD), not theoretical or argumentative articles. This decision is associated with the epistemology of the sub discipline selected for this study, Animal Production. It is not always taken into account that not all research articles are experimental, since some scientists, such as those in the fields of Mathematics, Astrophysics, and Engineering and Biostatistics using computing modeling and graphical simulation cannot experiment on their objects of study in the way other scientists, such as those in Agronomy, Veterinary Science, Food Technology, and Chemistry, are able to do (Swales, 2004; Tarone, Dwyer, Gillette, & Icke, 1998).

The review article has been deeply studied by Noguchi (2006), who proposed four different types of review articles, which can be briefly described as follows:

- History reviews provide a summary and synthesis of a field of research, may point to new directions of research, or shed light on previous misunderstandings so as to boost the field; in other words, they present a historical view of a facet of the field.
- Status quo reviews discuss the current situation in a field; they are useful to researchers in the field or related fields so as to be in the know of developments.
- Theory reviews introduce a theory or model to further work in the field.
- Issue reviews focus on some specific aspect(s) or issue(s) of the field of study.

This genre is essential for young scientists who read science, even when it seems to be far from the reach for young researchers since it is only accepted for publication from prominent scientists (Swales, 2004).

Citing Noguchi's yet unpublished dissertation (2001), Swales (2004), however, argues that her classification reflects the main focus of the article, not a distinctive feature. In other words, he states that any review article will present information related to the four aspects considered by Noguchi, but with different levels of emphasis.

These two genres, RA and RVA, have a central importance in the academic milieu. In the light of their functions and purposes, we consider both genres as essential in the scientists' labor: the research article, for for providing a framework to present an original claim about a phenomenon to an audience of researchers in a convincing manner, usually presented in such a way that their thoughts and behavior are modified as a consequence (Bazerman, 1988); the review article, for synthesizing and assessing knowledge and for serving as a linking genre within a discourse community (Noguchi, 2006). In this respect, Myers (1991) argues that

> … the writer of a review shapes the literature of a field into a story in order to enlist the support of readers to continue that story.
>
> … the present is still a scattering of articles reporting various results with various methods aimed at various immediate problems. That's why classic research papers … are often so hard to relate to the discoveries with which they are now associated; they are phrased in terms of immediate problems, while we understand the discovery in terms of a history leading to current work. The review selects from these papers, juxtaposes them, and puts them in a narrative that holds them together, a narrative with actors and events but still without an ending. It draws the reader into the writer's view of what has happened, and by ordering the recent past, suggests what can be done next. (pp. 45-46)

The need for this genre in the scientific international arena is increasing for many reasons, which are related to how science is evolving and growing: increased specialization of fields, lengthening in time of many research aspects within a field, and pressure to publish, among others.

2.2. State of the art

In this section, I position the current study in relation to contributions from works related to the research article and the review article from different perspectives (2.2.1), narrowing down to the state of the art in studies done specifically on titles (2.2.2). Finally I delineate the niche of the present thesis (2.2.3).

2.2.1. Studies on RAs and RVAs

The research article has been widely studied because of its essential role in the scientific communication network, as Swales shows in his 1990 review of the literature (Swales, 1990). From that work onwards, the interest has centered on different sections

of the genre, such as introduction (Shehzad, 2010; Swales, 1990), discussion (Dudley-Evans, 1994; Holmes, 1997; Martínez, 2003), results (Brett, 1994; Shehzad, 2010; Thompson, 1993; Young & Allison, 2003), as well as on different aspects of those sections or the article as a whole, such as moves (Dudley-Evans, 1994; Rezaee & Sayfouri, 2009; Swales, 1990), hedging (Crompton, 1997; Salager-Meyer, 1994), citations (Hyland, 1999), reporting verbs (Dubois, 1988; Hyland, 2002a), self-mention and use of first person (Hyland, 2001), vagueness (Myers, 1996), thematic structure (Gosden, 1992; Martínez, 2003), promotion (Bathia, 1993; Berkenkotter & Huckin, 1995; Hyland, 2000; Lindeberg, 2004; Swales, 2004), academic conflict or professional disagreement (Salager-Meyer, 2008), and lexical bundles and collocations (Hyland, 2008).

The interest in studying a variety of topics has come hand in hand with an interest in analyzing a great number of disciplines. Thus, the studies above mentioned and others center on a variety of disciplinary areas such as Physics (Gosden, 1992; Hyland, 2001; 2002a), Biochemistry (Thompson, 1993), Biology (Hyland, 1999; 2001; 2002a; Martínez, 2003), Medicine (Rezaee & Sayfouri, 2009; Salager-Meyer, 1994; 2008), Sociology (Brett, 1994; Hyland, 1999; 2001), Applied Linguistics (Hyland, 2001; 2002a; Young & Allison, 2003), Biomedical Sciences (Dubois, 1988), and Computer Science (Shehzad, 2010), among others. Although some of these studies do include sub disciplines, they lack a separate analysis of each of those sub disciplines, which is the case of Haggan (2004), who groups into the heading “Science” a variety of sub disciplines such as Biochemistry, Biophysics, Botany, Genetics, Inorganic Chemistry, Molecular Biology, Plant Physiology, Sedimentary Geology, and Zoology, among others. Therefore, there is scant research about this aspect of academic article analysis, and this scarcity is even more marked in the case of review articles (Noguchi, 2006; Soler, 2005; 2007; 2011; Swales, 2004). In fact, Swales (2004) states:

> Discoursal studies of review articles are rare: nor are they often discussed at length in scientific manuals. In fact, only two empirical studies are known to me: One is Myers (1991), who examined the review articles of two prominent molecular biologists; the other is Noguchi's doctoral dissertation (2001). (p. 208)

2.2.2. Studies on titles

2.2.2.1. Heterogeneity in studies on titles

Since Swales (1990) stated that titles of academic genres had not been much researched, there seems to have been a surge of interest in studying varied aspects of such a brief but important part of research articles and review articles (Soler, 2011). Indeed, we can talk about the birth of "a refined science" (Moore, 2010) in the area of academic English. What is more, this refined science has a name of its own: Titleology (Baicchi, 2003 as cited by Gesuato, 2008; Moore, 2010; Soler 2011).

Despite this distinction and attention, studies of titles in the scientific field have been found to be too heterogeneous for comparability, and conclusions seem neither definite as to results (Sisó, 2009; Soler, 2011) nor as to what features an effective title should display (Jalilifar, 2010). Studies on titles vary in design, topic, database size, applications, genres, disciplinary areas, and languages.

As an illustration of the heterogeneity above mentioned, in terms of topic, Busch-Lauer (2000), Fortanet, Coll, Palmer, and Posteguillo (1997), Goodman, Thacker, and Siegel (2001), Haggan (2004), Soler (2007), Wang and Bai (2007), Gesuato (2008), and Jalilifar (2010) focus on structure, although with quite different objectives and approaches, as it will be discussed in more detail later in this section; Buxton and Meadows (1977), Goodman (2000), Jalillifar (2010), and Yitzhaki (1994) centered their attention on title level of informativity; Mungra (2007) analyzed the use of metaphors; Sagi and Yechiam (2007) studied the possible relation between the use of humor in titles and the number of citations the article received; Sisó (2009) dealt with the anticipation of conclusions in titles as a persuasive journalistic strategy, and Ball (2009) studied the use of question marks in three disciplines in a forty-year period.

In terms of database size used in these studies, the number of titles analyzed ranged between 417 (Wang & Bai, 2007) and 20 million (Ball, 2009), by far the largest corpus. Sizes in between were around 500 (Haggan, 2004; Soler, 2007) or around 1000 (Gesuato, 2008; Jalilifar, 2010; Mungra, 2007; Sagi & Yechiam, 2007).

Titles were also studied in a variety of genres. To mention but a few examples, Haggan (2004), Wang and Bai (2007), Ball (2009), and Sisó (2009) centered their

attention on research articles only; Mungra (2007) focused her attention on all genres found within the journals collected, which included editorials, book reviews, perspectives, and clinical cases; Sagi and Yechiam (2007) worked with scientific articles; Soler (2007) analyzed research articles and review articles; Gesuato (2008) studied book dissertations, journal articles and proceedings papers; Jalilifar (2010) explored theses and research articles; Busch-Lauer (2000) focused on conference papers and journal articles, including within this category what she called subgenres, such as "case study".

In terms of disciplinary areas, some authors considered only one discipline. Others analyzed a number of disciplines, some of which involve a number of sub disciplines and of which no differentiated results are presented. Thus, Mungra (2007) and Wang and Bai (2007) analysed Medicine; Sagi and Yechiam (2007) focused their attention on Psychology; Gesuato (2008) did so with Linguistics; Jalilifar (2010) dealt with Applied Linguistics; Anthony (2001) analyzed Computer Science; Busch-Lauer (2000) focused on Medicine and Linguistics; Haggan (2004) centered her attention on Literature, Linguistics and Science, the last of which covers a wide range of subdisciplines, as already described above; Soler (2007) covered disciplines she grouped into Social Sciences (Linguistics, Anthropology and Psychology) as well as Natural Sciences (Biology, Medicine and Biochemistry); Ball (2009) selected Medicine, Life Sciences, and Physics. Fortanet et al. (1997) examined Computer Science, Applied Linguistics, Business and Economics, and Chemistry. Somewhere in the middle of studying either only one discipline or a number of disciplines, Sisó (2009) covered a wide array of disciplines within Biomedical Sciences such as Biochemistry, Molecular Biology, Veterinary Medicine, Developmental Biology, Cell Biology, and Reproductive Biology.

As to the language of the titles under consideration, some have studied titles in English only (Fortanet et al., 1997; Gesuato, 2008; Haggan, 2004; Jalillifar, 2010; Mungra, 2007; Sagi & Yechiam, 2007; Sisó, 2009; Wang & Bai, 2007), in English and Spanish (Soler, 2011), in English and German (Ball, 2009; Busch-Lauer, 2000).

Thus far about an illustration of heterogeneity in studies on titles. The following section provides an account of aspects of titles of interest to researchers, with a detailed perspective of title studies relevant to the present study.

2.2.2.2. Title typology: structure and pragmatic function

Types of titles in terms of structure and pragmatic function have been widely studied in different genres and disciplines. Dudley-Evans (1984) analyzed dissertation titles from very specific disciplines belonging to M. Sc., M. Phil., and Ph. D. courses: Conservation and Utilization of Plant Genetic Resources, Highway Engineering for Developing Countries, Biological Sciences and Electrical and Civil Engineering. He studied title structure, choice of headwords, and use of hedges. His brief study aimed at showing the importance of writing a correct dissertation title, as well as the positive pedagogical implications stemming from the discussions involving the student, the subject lecturer and the language teacher.

Fortanet et al. (1997) examined the structure and content of research article titles from Computer Science, Applied Linguistics, Business and Economics, and Chemistry, and found that Chemistry titles were the longest, while Linguistics titles were the shortest. Title structures were defined in terms of three punctuation marks: colon, semicolon, and full stop, which determined two units of meaning realizing different aspects of the study. These three punctuation marks were most frequent in Business and Economics, and least frequent in Computer Science. In all cases, the first unit of meaning delineated the most general aspect of the study, while the second expressed some specific aspect: general framework of the study-specific topic, topic-method, or general topic-specific focus.

Fortanet et at (1998) explored some syntactic aspects of their previous corpus. Among those aspects, they studied heads and modification. Their results showed a high occurrence of the structure pre modifier+head+post modifier. Titles in the field of Linguistics and Business and Economics, however, showed a preference for combination of heads, while Chemistry and Computer Science showed preference for a combination of pre and post modifiers.

Busch-Lauer (2000) examined the length, structure and communicative effectiveness (which together was called “appropriateness”) of 150 titles in Linguistics and Medicine from journal articles and conference papers in English and German, and 25 English titles written by German researchers. As to length, there were discipline- and language-related differences: titles of Linguistics were shorter than titles of Medicine

(8.4 and 9.9 words average respectively), and the titles in German were shorter than the ones in English. In all, the Medicine titles were long, precise, informative and appropriate for bibliographic searches and documentation. On the other hand, the Linguistics titles were short, vague, abstract, catchy and stylistically varied, but ineffective for bibliographic search purposes. As to structure, the Medicine titles in English, be it L1 or L2, showed a preference for a mono-structure format, while the titles in German and of Linguistics preferred a title-subtitle structure, mostly with nominal-nominal syntactic sequencing, although the titles of Linguistics showed a preference for verbal and clausal constructions. As to the pragmatic function of these structures, the most common relationship between the two parts was general-specific irrespective of discipline and language. As to appropriateness, the Linguistics subtitles were the only comprehensive and informative part of the combination. The Medicine titles, on the other hand, were precise and informative about the purpose, the results, and the subgenre (such as “case study”) of the relevant papers. However, the Linguistics titles often mentioned the process of the research, were vague and unspecific, but creative, richer in rhetorical devices, and reflective of the stylistic preference of the author.

Goodman, Thacker, and Siegel (2001) explored the titles of articles in medical journals from the period July-December 1995, and also queried journal editors about titles in their practices as reviewers. Four categories of title structures were considered, namely Topic only, Topic-method, Topic-results, and Topic-conclusion. Around 40% were of the type Topic only, 33% were Topic-methods, 18% were Topic-results, and only 2% were Topic-conclusion.

Anthony (2001) analyzed the length, word frequency, use of prepositions and punctuation in titles from several sub disciplines of Computer Science. Average title length was 9 words, with most titles being of between 6 and 12 words in length. High-frequency words varied from journal to journal, which showed content specificity. As to punctuation or title structure, 13% of titles presented the compound construction with colons. As to the semantic relation between the two parts of the colonic titles, the two more frequent were name-description and topic-scope, although journals varied greatly. Other categories were name of approach-algorithm-application, description of approach-algorithm-application, topic of research, scope of research, and method of research.

Haggan (2004) identified three research article title structures from Literature, Linguistics and Science: Full Sentence, Compound Construction and Noun Phrases with or without post modification, as well as their pragmatic function. The Literature and Linguistics titles were the shortest, averaging 9 words, while Science titles were the longest, averaging 14 words. Full Sentence titles were the longest in all disciplines. They accounted for 8.5% of Science titles, and they made assertions as statements of facts realized by no use of hedges and the use of the simple present tense. This would respond, according to Haggan, to the need to inform, and to inform quickly, of what is relevant in the study. Full Sentence titles accounted for 4.2% of Literature titles, and 4.3% of Linguistic titles. According to the author, in Linguistics, the writer wants to intrigue the reader by designing a clever sentence that attracts him or her into reading the whole article. In Literature, Full Sentence titles are aesthetically virtuous, leading the reader to appreciate new insights of the study. Compound titles accounted for 21.5% in Science, the two structures found were two noun phrases linked by either a colon, full stop or dash and, in line with Fortanet et al. (1997), the first noun phrase expresses the general topic and the second noun phrase narrows down the general topic to a specific aspect of the study, which may be application, geographic location, and field of study, among others. Compound titles accounted for 60.8% in Literature, and 30.4% in Linguistics. In Linguistics, compound titles follow the Science pattern. In Literature, the structures at either side of the punctuation marks were more varied: participial clauses, prepositional phrases and infinitive phrases and quotations in the first part. The author considers that creativity seems to serve the purpose of attracting the reader. Noun phrase titles with one or more prepositional phrases represented 75% of all Science titles in the corpus. According to the author, the need of the scientist to inform the reader is again made clear by this structure which allows so by means of adding up prepositional phrases, with “of” being the most frequent preposition, followed by “in”.

Soler (2007) explored the syntactic structure and pragmatic function of review article and research article titles from Social Sciences (Linguistics, Anthropology and Psychology), and Natural Sciences (Biology, Medicine and Biochemistry) from the period 1996-2002. In all, the Social Sciences titles showed more flexibility of structure use, contrasting to the Natural Science titles, which preferred a more direct presentation of the object of study. Soler’s results showed that titles from Linguistics were the shortest in both genres, coincidental with Busch-Lauer (2000), Fortanet et al. (1997),

and Haggan 2004, while the Natural Science titles were the longest, averaging 14,98 words per title, with the exception of Psychology review article titles, which showed to be longer than both Biology and Biochemistry review articles. Soler identified the same structures as Haggan (Full Sentence, Compound Construction, and Noun Phrases with or without post modification), plus a fourth category: Questions. In agreement with Haggan's findings, Nominal Group titles were the most frequent structure in all the disciplines studied except for Biology and Biochemistry. Noun phrase titles showed structure variety with pre modifier+head and pre modifier+head+post modifier, and with post modification featuring prepositional phrases and occurrence of –ing form. Noun phrases were used to name, classify, and describe the phenomena studied. The Full Sentence structure was found to be a disciplinary and generic peculiarity of Natural Science research papers, showing a majority in Biology and Biochemistry (51% and 46%, respectively). This structure presented findings by means of the simple present tense, in a conclusive way. The Compound titles were common in research papers and in the Social Sciences and, coincidental with Haggan's findings, they mostly presented the general-specific structure following Swales' categorization. This structure was used also for descriptive purposes as an alternative style to Noun phrase titles. The Question titles were the most infrequent structure, used mostly in review articles.

Wang and Bai (2007) examined medical research article titles from the period July 2003-July 2005 taking into account syntactic structure and pragmatic function. They analyzed Nominal Group titles considering number of heads and types of post modification. Title length averaged 10.9 words, 99% realized as Nominal Group featuring one head (75%), combined with post modification mostly in the form of prepositional phrases (68%). According to the authors, the high occurrence of this title structure is explained in terms of this structure's ability to compact information, especially of packaging information very densely by way of prepositional phrases, with "of" being the most usual preposition and Nominal Group titles being the most usual structure, which coincides with findings of Soler (2007) and Haggan (2004).

2.2.2.3. Title colonicity and titles with question mark

Stemming from title structure, the use of colons and question marks has been specially researched. According to Hartley (2005; 2007a; 2007b; 2007c), the use of "colonic" or "hanging" titles (Day, 1998; Hartley, 2005), or "title colonicity" (Dillon,

1981) has increased overtime in some disciplines; colonic titles are longer and more informative; they differ across disciplines in terms of length (between 8 and 15 words), punctuation (with or without colons), and pragmatic function; they could introduce a general topic, specify a precise theme, express a question, delineate the author's argument, express the method, suggest guidelines, attract readers through strategies such as vagueness, allusions, and alliterations; they also differ across genres, with books showing shorter and more-to-the-point titles than articles.

Dillon (1982) studied the use of colons in 1150 journal article titles in Education, Psychology and Literary Criticism over the period 1880-1980. He could record a steady increase in compound titles across the three disciplines. Michelson (1994) analyzed titles in Industrial Relations journal articles. Around 38% of titles were colonic.

Ball (2009) examined the use of questions in nearly 20 million titles in Medicine, Life Sciences, and Physics from the period 1966-2005. Overall, he found a significant increase from 50% to more than 200% in the number of titles with question-marks along this 40-year period. According to the author, the reasons behind the growing use of this rhetorical device would lie in the pressure for niche occupancy in an ever expanding scientific universe with a dramatic increase in number of disciplines and number of articles in the last decades; this need was to express the central issue of the research, to hook the reader's interest, and to express vague, non-definite results.

Hyland (2002b) explores the distribution and use of questions in a corpus of 1.8 million words of the different parts of research articles, textbooks and L2 student essays, as well as by interviewing insider informants on the perceptions, interests, and needs of the potential readers. Overall, the author notes the dialogic nature of questions serving to engage the reader in the writer's argumentation in different ways depending on the genre. As to questions in titles of research articles specifically, the author states that questions promote the article and, at the same time, they help to consider the reader as an insider of the issue with enough knowledge as to have a plausible answer to the question posed at the very beginning of the research work.

2.2.2.4. Features of a well-written title: precision, information, easy-indexation

In 2.2.2.2, we can see that across most of those studies, some similar and closely related pragmatic aspects of titles have been identified, all of them related in some way

or another to the features of what is considered a well-written title (see 1.1. Context and Issue above). Busch-Lauer (2000) calls it appropriateness, which he defines as the combination of length, structure and communicative effectiveness; Goodman et al. (2000) comment on the ambiguity of the titles analyzed and the modification of titles by the editors for clarity and informativity; Haggan (2004) interprets the use of certain rhetorical functions and the absence of others in titles as the need to inform as soon as possible about important aspects of the study; Soler (2007) mentions the presence of description, classification and naming of phenomena; Wang and Bai (2007), finally, highlight information packaging.

There are, however, studies specifically addressing these features. Buxton and Meadows (1977) measured the content of information of paper titles by analyzing their "substantive" or content words. Their corpus consisted of samples in English from eleven periodicals in different disciplines from the years 1947, 1962, and 1976, and from French and German periodicals from 1973 in Physical Chemistry and History. Titles in Chemistry and Botany showed a higher information content than titles in the Social Sciences, of which Philosophy showed the lowest. As to the kinds of words representing the increase, the authors found that in Chemistry, these words identified the new techniques and aspects of the study. The authors stated that the number of content words per title is not an appropriate basis to compare level of informativity between titles from different languages since languages are different in the way several concepts may be combined into a single word (such as German 'arbeiterklasse' and English 'working classes', or French 'auto diffusion' and English 'self-diffusion'). The authors explained the increase in the use of substantive words of titles with time in the need of researchers to make their articles easily retrievable. On the other hand, Social Science titles showed to be less appropriate for retrieval, due to a lack of a semi-systematic nomenclature, which is common in the natural and hard sciences.

Jalilifar (2010) analyzed article titles from Applied Linguistics journals and MA and PhD thesis titles from the period 2002-2009 focusing on title length, informativity, defined in terms of presence of area, scope, topic, and method in the title, as well as types of heads from Dudley-Evans' categorization (Dudley-Evans, 1984), and syntactic structures, namely Noun Phrase, Verb Phrase, Prepositional Phrase, Sentence, and Compound Construction. As to title length, thesis articles were longer than article titles, averaging 14.09 and 10.60 words respectively. As to syntactic structure, Compound

Constructions were by far the most preferred structure (53.15%) in article titles, but they only accounted for 21.16% in thesis titles. Noun Phrases were first in preference for thesis titles (71.16%), and took second place of preference in articles titles (35.40%). The rest of the title constructions accounted for less than 10%. Within Compound Construction titles, the most preferred combinations were noun phrase-noun phrase in both genres (26.27% in articles and 16.36% in thesis), followed by verb phrase-noun phrase, but in a much lower percentage. In all, article titles showed more variability in the use of combinations (noun phrase-verb phrase, sentence-noun phrase, noun phrase-sentence, verb phrase-verb phrase). As to informativity, the results showed that it was realized more explicitly in the thesis titles than in the article ones. In both genres, topic and scope were the most widely considered aspects set forth in the title (98.89% in article titles and 100% in thesis titles, and 71.61% in article titles and 93.82% in thesis titles, respectively).

Validity of informativity and its prevalence in Biomedical article titles was addressed by Goodman (2000). He searched titles containing 12 active verbs as markers of informativity, of clinical trial reports at a five-year interval (1970-1995), and 1997 as the last full year. Goodman states that, according to the popperian model, hypotheses cannot be proved, but only supported or rejected, and even in this case, only to an arbitrary level of statistical information. Thus, informative titles (those containing an active verb such as “prevents”, “prolongs”, “reduces”) are incorrect, but hypotheses that are rejected survive and live on in the titles containing them. He found 24 titles containing the word “prevents” in 1996, showing an overly optimistic attitude from the authors, since when reading the abstract, the conclusion was more honest and less conclusive with expressions such as “significantly reduces the rate of …” None of the verbs considered were found in 1970, but their prevalence increased overtime. The author suggests editors to ask for indicative titles (those expressing the purpose of the study), or alter authors’ informative titles during editing.

2.2.3. Identifying a gap

The existing literature on titles has focused on a variety of aspects; yet, there is scarcity of works addressing, in depth, titles of research and review articles in sub disciplines, especially of Veterinary Science or any of its sub disciplines, such as Animal Production. In his study of Veterinary Medicine article titles, Cianflone (2010)

states that titles should meet the requirements of informativity and economy, and that in Veterinary Sciences in particular, these features should conform to patterns which include the topic, the subjects of the study, and other relevant information. He analyzed these features in the light of four different formats explored by other authors: Nominal, Full Sentence, Compound, and Question. He does not offer quantitative data, but describes the pragmatic function of those four structures in 63 Veterinary Medicine titles from four journals in 2010. He suggests perspective writers to follow discipline-based conventions, and avoid imprecision, which may manifest itself in the title by minimization, (or omission of important information), overgeneralization, (which leads to wrong message), and unclear message.

We have seen that, while some works show prevalence of the Noun Phrase structure over the Compound Construction (Haggan, 2004; Soler 2007; Wang & Bai, 2007), the Compound Structure has increased its use overtime (Hartley, 2005), and Questions are specific of certain group of disciplines (Hyland, 2002b).

There is disagreement among findings of different works related to the same group of disciplines as in Soler (2007) and Haggan (2004), as to the use of Full Sentence titles in Biology and Biochemistry, or the results from Jalilifar (2010) and those in Haggan (2004) and Soler (2007) as to the most frequent structure.

Also, the literature does not show agreement in results related to the use of certain structures within the same discipline (Medicine), the most striking being the Full Sentence. The use of this structure shows a marked increase overtime (Hartley, 2007c) and is also being strongly encouraged (McGowan & Tugwell, 2005). However, its use is strongly opposed by some authors in certain disciplines, especially due to epistemological reasons (Goodman, 2000).

There is no agreement either as to the definition of certain concepts such as “informativity”, one of the features of what is considered a well-written title, a concept that is interpreted differently by Buxton and Meadows (1977), Goodman (2000), and Jalilifar (2010). While the first analyses the information content in titles in terms of number of substantive words per title, the second explores informativity in titles according to the presence of active verbs such as “prevents” and “reduces”, and the third examines informativity in titles in terms of presence of area, scope, topic, and

method. What is more, some authors, such as Cianflone (2010), consider this aspect an important feature of titles, but they do not provide a definition of the concept.

As to title structures, there is no agreed criteria of categorization: Jalilifar (2010) considers Noun Phrase, Verb Phrase, Prepositional Phrase, Sentence, and Compound Construction; Haggan (2004), Soler (2007), and Cianflone (2010) propose similar categories in the title structures considered: Full Sentence, Compound Construction, and Noun Phrase, but Soler and Cianflone add a fourth: Question. In Compound Construction in particular, there is no general agreement as to the categories considered to analyze its pragmatic function. Fortanet et al (1997) consider general framework of the study : specific topic, topic : method, general topic : specific focus; Goodman et al (2001) consider topic : method, topic : results, and topic : conclusions. They also consider a fourth category, which they called “topic only”, but of which we do not know whether it is a Sentence, a Question, or a Noun Phrase.

What seems to be largely lacking is corpus-based studies on sub disciplines addressing key aspects of titles, specifically title typology in terms of structure and pragmatic function, use of heads and modification, and how these aspects may translate into a well-written title in terms of precision, informativity and easy indexation, features which may account for trends that can guide novice researchers in an efficient decoding and encoding of research article titles and a decoding of review article titles belonging to their specific fields.

CHAPTER 3: MATERIALS AND METHODS

The methodology of this study is based on the approach proposed by Hyland (2000), which involves collecting a corpus of published texts from online publications, and analyzing them so as to discover the relationships between linguistic forms used and rhetorical effects produced in a specific discourse community. In this way, I intend to identify the specific linguistic patterns of research article and review article titles that writers most usually resort to and to analyze how writers use these patterns to achieve their communicative purposes. I also consulted expert informants on certain specific aspects of the present study by means of personal meetings.

This thesis consists of a cross-generic, corpus-based empirical study of titles based on two distinct approaches. On the one hand, I carried out a quantitative analysis considering basic statistical data of titles: title length, lexical density, and word frequency rankings. This perspective is useful in that it provides an insight into frequencies of use, suggesting tendencies in how writers express meaning (Hyland, 2000). On the other hand, I carried out a qualitative analysis focusing on the title structures, and then, stemming from this analysis, an examination of title heads and their modification patterns, as well as their pragmatic functions. I concentrated on these particular aspects of titles since, as Hyland (2000) suggests, it is impossible to carry out an exhaustive and comprehensive analysis of the corpus collected. He quotes De Beaugrande (1998, p. 91) to stress the fact that researchers should be selective in their focus of study.

3.1. MATERIALS

In this section, I provide a description of the two corpora used in this study in terms of time period, criteria for journal selection, as well as the title collection procedure. I also describe some constraints I faced during this process. Finally, I provide a detailed characterization of the categories for analysis, the steps followed in the analysis, as well as the statistical programs used.

3.1.1. Collection and description of the corpora

I worked with 15 journals in electronic form from a wide English speaking geographical range (United States, Canada, United Kingdom, Australia) so as to ensure a collection of representative article titles of the field, which were also available for retrieval (Hyland, 2000; Lindeberg, 2004; Sinclair, 2004a). The impact factor of the fifteen journals selected for this study ranged between 0.318 and 3.13 in the period 2008-2011 (see Appendix A).

The journals were nominated by experts in the field of Animal Production from my workplace, Facultad de Ciencias Veterinarias at Universidad Nacional del Centro (UNICEN), which strengthens the corpus representativeness. By “experts” in the field I mean senior researchers, experienced in reading, writing and publishing in English in prestigious international journals related to the discipline, and with an advanced level of English. It is worth mentioning that in my work context, there are no native speakers of English who are experts in the field.

From each of the fifteen journals proposed by the disciplinary informants, I took the period 2008-2011 to select titles from two distinct genres: research articles and review articles. For research articles, I selected 20 titles of articles per journal with the IMRD format, which makes 75 article titles per year, to attend the principle of comparability, a feature considered of great importance by Lindeberg (2004) and Soler (2009) in their studies with corpus. This selection resulted in a total of 300 titles. The research article titles were selected as follows: from each issue considered, I selected every other title, starting both from the first and the last, as well as from the second and the one before last. For example, in one journal I selected titles 1 (the first one in the issue), 3, 5, 7, and so on; in another journal I selected titles 25 (the last in the issue), 23, 21, 19, and so on. In another journal I selected titles 2 (the second in the issue), 4, 6, 8, and so on, and in another journal I selected titles 24 (the title before last), 22, 20, 18, and so on.

I found that journal No. 7, *Australian Journal of Agricultural Research*, had changed names from 2009 on, turning into *Crop and Pasture Science* (See Appendix A). For this case, then, I selected 5 titles from the first version and 15 titles from the second, to reach the 20 titles per journal.

For review articles, I anticipated that taking the same number of review article titles from the period mentioned above would not be possible since review articles are more sparingly published, which stems from its very pragmatic function, as Soler (2007) stated in her study of research article and review article titles. Thus, I retrieved all the review article titles from the period mentioned, and this search yielded a total of 180 review articles, with two journals yielding no reviews at all in that period, and the remaining journals yielding between 3 and 44 review article titles. In all, I collected a corpus of 480 article titles for analysis: 300 research and 180 review article titles from the 15 journals already mentioned. I accessed most journals by using Science Direct (www.sciencedirect.com) available from the on-line electronic library of the Ministry of Science and Technology (www.mincyt.gob.ar.), except for Grass and Forage Science, New Zealand Journal of Agricultural Science, Canadian Journal of Animal Science, and Rangeland Ecology and Management[1], all of which have a method similar to Science Direct for title selection and storage.

3.1.2. Title categories for the analysis

The categories employed for the analysis resulted from adapting and combining existing ones (Dudley-Evans, 1984; Goodman et al., 2001; Haggan, 2004; Rezaee & Sayfouri, 2009; Soler, 2007; 2009; 2011; Swales & Feak, 1994; Wang & Bai, 2007). The resulting categories were based on length, genres, structures, heads (number and types), head modification (number and types). This section provides the categories, their definitions and examples. (See Appendix B for a complete list of categories).

The category Length (Category 12) considers length of titles in terms of four word-number ranges, namely below 10 words (Subcategory 12.1.), between 10 and 19 words (Subcategory 12.2.), between 20 and 25 words (Subcategory 12.3.), and above 25 words (subcategory 12.4.).

[1]Published, respectively, by Wiley, Taylor & Francis Co., Agricultural Institute of Canada, and JSTOR.

The category Structure (Category 1) involves the subcategories Noun Phrase, Compound Construction, Sentence and Others. The following section describes these subcategories in detail, as well as the aspects analyzed in some of them.

The subcategory Noun Phrase (Subcategory 1.1.), as defined by a reference grammar (Quirk et al. (1985), refers to structures containing four constituting parts: a head, "around which the other constituents cluster" (p. 1238), determinatives, such as *all*, *some*, *many*, pre modification, comprising items before the head other than determinatives, mostly adjectives and nouns, and post modification, such as prepositional phrases.

The following are examples of the subcategory Noun Phrase from my corpus:

(1). *The environmental performance of milk production on a typical Portuguese dairy farm*

(2). *Modeling a farm population to estimate on-farm compliance costs and environmental effects of a grassland extensification scheme at the regional scale*

Two aspects of the subcategory Noun Phrase were analyzed: headwords and modification. The category Headword refers to title headwords. The term "head", from the prevailing semantic point of view, has been used, in structural grammar, to refer to what intuitively was considered "the most important part of a phrase (its central element or nucleus)" (Keizer, 2007). Furthermore, Quirk and Greenbaum (1979) define *head* as "[the element] around which the other components cluster and which dictates concord and other types of congruence with the rest of the sentence outside the noun phrase" (p. 375).

From the quantitative point of view, I made a distinction between titles with a range of heads from 1 to 4 (Category 3), and I made a distinction between uni-head and multi-head Noun Phrases (Category 4).

The following are examples from my corpus illustrating cases of one (3), two (4), three (5), and four (6) heads in titles (heads in bold);

(3). ***Use*** *of a dynamic programming model to estimate the value of clinical mastitis treatment and prevention options utilized by dairy producers* (one-head title)

(4). *The relative **profitability** and environmental **impacts** of different sheep systems in a Mediterranean environment* (two-head title)

(5). *Straw **management**, crop **rotation**, and nitrogen source **effect** on wheat grain yield and nitrogen use efficiency* (three-head title)

(6). *Dry **matter**, nitrogen and phosphorus **accumulation**, **partitioning** and **remobilization** as affected by N and P fertilization and source–sink relations* (four-head title)

From the qualitative point of view, six subcategories of heads (Category 2) were considered for all title structures: the first four types of heads were drawn from Dudley-Evans' categorization of heads in dissertation titles (Dudley-Evans, 1984); the remaining two were proposed by myself as they emerged from the data. In his categorization, Dudley-Evans proposes the category "general classifying words that describe either the action taken or the results". I divided this subcategory into two distinct ones, *General classifying words that describe the action taken* and *General classifying words that describe the results (nouns and verbs)* because I consider that they convey different pragmatic functions. Thus, the six head subcategories resulted in the types which I list below with examples taken from my corpus.

General classifying words that describe the action taken (Subcategory 2.1.):

(7). *study, investigation, analysis, evaluation, assessment*

General classifying words that describe the results (nouns and verbs) (Subcategory 2.2.):

(8). *effect, influence, differences, responses, validation, impact, role, affect, does not regulate*

Verbal nouns describing a particular process (Subcategory 2.3.):

(9). *digestion, production, development, growth*

Nouns describing property (Subcategory 2.4.):

(10). *profitability, variability, sustainability*

Nouns describing the object of study (Subcategory 2.5.):

(11). *flowers, peptides, metabolites*

Nouns describing or implying genre (Subcategory 2.6.):

(12). *review, progress and challenges, revisiting, (current) knowledge and perspectives, lessons*

As stated above, I also analyzed Modification in Uni Head Noun Groups. First, I classified head modification considering whether the head has pre modification only (Subcategory 5.1.), post modification only (Subcategory 5.2.), or both pre and post modification (Subcategory 5.3).

The following are examples of head modification from my corpus (modification in bold):

(13). ***Streptococcus thermophilus*** *bacteriophages* (title with pre modification only)

(14). *Modeling* ***a farm population to estimate on-farm compliance costs and environmental effects of a grassland extensification scheme at the regional scale*** (title with post modification only)

(15). ***Economic*** *evaluation* ***of current and alternative dual-purpose cattle systems for smallholder farms in the central Peruvian highlands*** (title with both pre and post modification)

Then, and for a detailed analysis of modification from the quantitative point of view, I also analyzed both pre modification (Category 6) and post modification (Category 7) in terms of number of qualifiers. Lastly, from the qualitative point of view, I analyzed post modification as realized by different structures (Category 8), considering prepositional phases (Subcategory 8.1), past participle clauses (Subcategory 8.2), to-infinitive clauses (Subcategory 8.3), present participle clauses (Subcategory 8.4), (Wang & Bai (2007), and noun phrases (Subcategory 8.5). I also included the subcategories Others (Subcategory 8.6) and Combination (Subcategory 8.7). The former comprises any case not fitting the previous ones, but whose number of occurrences did

not justify the creation of a new Subcategory; the latter comprises the cases in which two or more kinds of post modification structures are present in the same title.

The following are examples (in bold) of the structure Post modification in Subcategory Noun Phrase (uni-heads only) from my corpus:

(16). *"Use **of a dynamic programming model** to estimate the value of clinical mastitis treatment and prevention options utilized by dairy producers"* (Prepositional Phrase)

(17). *"Semen variables of sheep (Ovisaries) **experimentally infected with Toxoplasma gondii**"* (Past Participle Clause)

(18). *"Use of normalized difference vegetation index, nitrogen concentration, and total nitrogen content of whole maize plant and plant fractions **to estimate yield and nutritive value of hybrid forage maize**"* (To-infinitive Clause)

(19). *"An attempt to predict pork drip loss from pH and colour measurements or near infrared spectra **using artificial neural networks**"* (Present Participle Clause)

(20). *"Modeling **milk urea** of Walloon dairy cows in management perspectives"* (Noun Phrase)

(21). *"Optimizing **legume content and forage yield** of mown white clover–Italian ryegrass mixtures through nitrogen fertilization and grass row spacing"* (Noun phrase)

(22). *"A review of uterine structural modifications **that influence conceptus implantation and development in sheep and goats**"* (Others)

(23). *"Analysis **of genetic diversity in four Canadian swine breeds using pedigree data*** (Combination: two prepositional groups and a present participle clause).

(24). *"Use **of a dynamic programming model to estimate the value of clinical mastitis treatment and prevention options utilized by dairy producers**"* (Combination: prepositional group, to-infinitive clause, and a past participle clause)

The subcategory Sentence (Subcategory 1.2) involves what Quirk et al. (1985) classify as simple or multiple. A simple sentence is understood here as "a single

independent clause", that is, "an independent clause that does not have another clause functioning as one of its elements" (p. 719). A multiple sentence "contains one or more clauses as its immediate constituents" (p. 719). Within the latter, the distinction is made between Compound and Complex sentences, the first one consisting of two or more coordinate clauses, the second comprising one or more elements realized by a subordinate clause. In the present study, no distinction was made between simple and multiple sentences. The Subcategory Sentence comprises sentence types, namely Statements (Subcategory 9.1), both affirmative and negative, and Questions (Subcategory 9.2).

The following are examples of the Subcategory Sentence from my corpus:

(25). *"Nitrate leaching from organic arable crop rotations is mostly determined by autumn field management"* (Affirmative statement)

(26). *"Increased [CO2] does not compensate for negative effects on yield caused by higher temperature and [O3] in Brassica napus L"* (Negative statement)

(27). *"Should crop scientists consider a journal's impact factor in deciding where to publish?"* (Question)

The Subcategory Compound Construction (Subcategory 1.3) consists of titles formed by two parts separated mostly by a colon, "colonic titles" in the words of Hartley (2007a), and less frequently by a dash. The parts can be made up by noun phrases (NP), or by a combination of noun phrases and other structures.

The following are examples of the Subcategory Compound Construction from my corpus:

(28). *"Submergence risks and farmers' preferences: Implications for breeding Sub1 rice in Southeast Asia"* (NP + NP)

(29). *"Increasing incomes of Malian cotton farmers: Is elimination of US subsidies the only solution?"* (NP + Question)

(30). *"How resource poor households value and access poultry: Village poultry keeping in Tigray, Ethiopia"* (Statement + NP)

(31). *"Developments in dairy foods sensory science and education: From student contests to impact on product quality"* (NP + Prepositional Phrase)

The Subcategory Compound Construction was further analyzed in terms of both structure and relationship between the two parts.

In terms of Structure (Category 10), the analysis provided four types of structure combinations, namely a noun phrase plus either another noun phrase (Subcategory 10.1), a question (Subcategory 10.2), a statement (Subcategory 10.3), or a prepositional phrase (Subcategory 10.4), regardless of the order of the parts (see examples above). In terms of Relationship between the two parts (Category 11), or "what [is] going on on either side of the colon", in Swales' terms (personal communication), I based my categorization on Swales and Feak (1994) to classify Compound titles. In their course of academic writing for nonnative speakers of English, these authors propose four categories of compound titles, inviting the reader to "think of others" (Swales, 1994, p. 209). Thus, I modified the categorization in terms of application as well as use in the particular discipline of this study, as suggested by Swales (personal communication). Thus, the application of Swales and Feak's categorization of compound titles provided the subcategories I list below, plus a new subcategory related exclusively to the genre review article, with examples from my corpus:

General: Specific (Subcategory 11.1**)**: The first part defines the context, the setting, the general topic; the second part specifies the study or delimits its scope in terms of geographical location, object of the study, variables considered, etc.

(32). *"Gonadotropin-releasing hormone-induced ovulation and luteinizing hormone release in beef heifers: Effect of day of the cycle"*

Topic: Method (Subcategory 11.2): The first part defines the general topic of the study; the second part specifies it by defining the methodology used.

(33). *"Evaluating an environmental indicator: Case study of MERLIN, a method for assessing the risk of nitrate leaching"*

Problem: Solution (Subcategory 11.3): The first part presents a problem; the second part a possible solution or the solution to it, or a question either inviting the reader to think about a solution, or raising awareness about the need for a solution.

(34). *"Increasing incomes of Malian cotton farmers: Is elimination of US subsidies the only solution?"*

Major: Minor (Subcategory 11.4): The first part defines the topic of the whole study; the second part defines the part of that study that the article in question addresses or involves. In other words, there will be more than one article with exactly the same first part in the title; what will vary is the second part, since we face a study whose publication has been divided in two or more articles, the order of which is given by means of numerated second parts.

(35). *"Establishment and production of common sainfoin (Onobrychisviciifolia Scop.) in the UK. 1. Effects of sowing date and autumn management on establishment and yield"*

(36). *"Establishment and production of common sainfoin (Onobrychisviciifolia Scop.) in the UK. 2. "Effects of direct sowing and under sowing in spring barley on sainfoin and sainfoin-grass mixtures"*

Genre: Topic (Subcategory 11.5.): One of the parts indicates the genre of the article; the other defines the topic of the article.

(37). *"Chickpeas (Cicerarietinum L.) in animal nutrition: A review"*

(38). *"Review: The regulation of meiotic maturation in bovine oocytes"*

Thus far about the Subcategory Compound Construction. The Subcategory Others comprises cases not belonging to the previous categories, such as cases consisting of one or more noun phrases, each of them headed by a preposition. The number of occurrences of these cases did not justify a whole new category of its own.

(39). *"From agricultural science to 'biological economies'?"*

3. 1. 3. Statistical programs

For the quantitative analysis, the titles were examined using the word counting tool included in Microsoft Word and the statistical tools provided by Microsoft Excel 2010, as well as the program AntConc3.2.4w (Anthony, 2011). The INFOSTAT program was used for the rest of the data analysis.

3. 2. METHODOLOGY

The categories were classified manually. When in doubt as to classification of titles into some categories that presented conflicting views involving content interpretation, or classification of heads, I consulted expert informants in the discipline of Animal Production so as to validate findings (Hyland, 2000) as well as clear out possible misinterpretations stemming from my lack of expertise in the field of Animal Production. In this respect, the expert informants and I had a number of meetings throughout the development of the present work. These meetings were held individually with each of the experts. I described to them, in a succinct way, the objectives of the thesis and the categories for analysis, in such a way that they could understand and clear out my doubts with enough background information.

I counted the number of words per title to obtain measures of central location, i.e., mean (or average), and mode (or the most frequently occurring value), as well as measures of dispersion, i.e., range (considering the shortest and the longest titles). The reason for including measures of both central location and dispersion was to obtain a more comprehensible picture of what is going on in terms of length.

I established lexical density by establishing the relationship between lexical and structural word content. I also obtained the rankings of lexical and structural words so as to establish the most frequent terms in the corpus, with a succinct comment on the use of the most frequent structural words.

The statistical categories as well as the categories for analysis listed and described above were loaded in the INFOSTAT program, which provided the data needed for the targeted items and their analysis.

CHAPTER 4: RESULTS AND DISCUSSION

This section is organized as follows: first, I present basic quantitative data about title length, lexical density and word frequency of RA and RVA titles (Section 4.1). Then, in Section 4.2, I present and discuss the RA title's results in the light of the theoretical framework underpinning this study: title structures (Section 4.2.1), head number in Noun Phrase titles and head types in all title structures (Section 4.2.2), number of modifications, structures, and the pragmatic functions of structures in uni-head Noun Phrase titles (Section 4.2.3). In section 4.3, I present the results and discussion of the RVA titles in the same light as the RA titles, and simultaneously, I establish a comparison with the RA titles' findings and discuss this comparison.

4.1. Title length, lexical density, and word frequency of RA and RVA

4.1.1. Title length of RA and RVA

The quantitative data about title length of RAs and RVAs are shown in Table 4.1 (Details per journal in Appendixes C and D).

Table 4.1.Length of RA titles (N= 300) and RVA titles (N= 180)

GENRE	no. of words	mean (words per title)	range (lowest and highest no. of words per title)	mode (highest occurrence of no. of words per title)	standard deviation
RA	**4731**	**15.77**	**5-40**	**14**	**5.110**
RVA	**2261**	**13.26**	**3-29**	**10**	**4.588**

In RAs, title length ranged between 5 words and 40 words, as illustrated in the following examples:

(1). *Embryo recovery from exercised mares*

(2). *Polymorphisms and haplotypes in the bovine neuropeptide Y, growth hormone receptor, ghrelin, insulin-like growth factor 2, and uncoupling proteins 2 and 3 genes and their associations with measures of growth, performance, feed efficiency, and carcass merit in beef*

Indeed, 5 and 40 words in research article titles is a wide l range (= 35), but when the figures are examined more closely, it is possible to see that, while those are extreme values, they are not frequent. In fact, mode values ranged between 10 and 19 words in 71% of the cases with 15.77 being the mean number of words. These results are close to those obtained by Soler (2007), whose findings on Natural Science titles showed a mean value of 14.98 words per title. They are a little higher than those obtained by Haggan (2004), who found a mean number of words of 13.8 for Science titles. In my study, the most frequent title length was 14 words, a little lower than the mean value. The following title is a case of a 14-word title, the most frequent length for RA titles:

(3). *The relative profitability and environmental impacts of different sheep systems in a Mediterranean environment*

(See Appendix E for more examples of 14-word RA titles).

In RVAs, title length ranged between 3 words and 29 words, as exemplified by the following cases:

(4). *Streptococcus thermophilus bacteriophages*

(5). *A review of factors that impact on the capacity of beef cattle females to conceive, maintain a pregnancy and wean a calf—Implications for reproductive efficiency in northern Australia*

This is also a wide range (= 26) but, again, these extreme values are not frequent. Indeed, mode values ranged between 9 and 19 words (67.8%), with 13.26 being the mean value. This mean value is lower than that found for RAs, but it is not revealing of the precise picture of trends in this corpus since the most frequent title length for RVAs is 10 words. This shows that RA titles appear to be longer than RVA titles, which agrees with Soler's (2007) findings. Below is an example of a 10-word title, the most frequent length for RVA:

(6). *Community and occupational health concerns in pork production: a review*

(See Appendix F for more examples of 10-word RVA titles).

The fact that RA titles were longer than RVA titles may be related to the way the genre develops the argument of experimentation. Specifically, a number of variables are involved in an empirical study, both independent and dependent. The higher the number of variables included in the title, the more specific the information about the study, which makes it possible for the reader to decide whether to continue reading the article. This feature of RAs has been highlighted by Haggan (2004):

> The reader needs to know as early as possible in the reading process whether or not the paper contains anything that is of relevance to his own work. … The writer … must try to design the title in such a way that it will attract the attention of other scientists working **within his own narrow specialization**. (p. 296, emphasis in bold is my own)

In the same line, Busch-Lauer (2000) concluded that the Medicine titles of her corpus were "long, precise, informative and appropriate for bibliographic searches" when compared with the Linguistics titles.

Informing the reader about the different variables and aspects of the study is an extremely useful feature that titles should display, and it is in strong association with the huge mass of growing published data that scientists face when doing their searches. The higher the number of variables and aspects of the study provided by the writer scientist in the title, the higher the precision the reader scientist will have as to the nature of the study, and the less probability that he or she will need to read any other part of the article to decide to use that article in his or her research.

On the other hand, RVAs are indicative of where a given subject matter stands in terms of previous studies made on the topic, and also suggest future paths of research; this summarizing feature could explain their shorter length as compared to RAs. (See Table 4.1) (Details per journal in Appendix C)

In the light of title structures, Table 4.2 shows that 213 out of 300 RA titles fell within the range of 10 and 19 words, of which 161 titles were Noun Phrases, followed far behind by Compound Construction titles, with 27 occurrences, and Sentence titles, with 25 occurrences. Second place took the range 20 and 25 words, with 53 occurrences, out of which 31 titles were Noun Phrases. Titles shorter than 10-word length show 21 occurrences, most being Noun Phrases. Lastly, titles longer than 25 words presented an occurrence of 13 titles, out of which 9 are Noun Phrases, followed

by Compound Construction titles with 3 instances. Thus, we can see that most RA titles were Noun Phrases of between 10 and 19 words, followed by Compound Construction and Sentences of the same length with similar number of occurrences.

Table 4.2. Length of RA titles according to structure (N=300)

RA TITLE LENGTH	RA TITLE STRUCTURE			TOTALS
	Noun Phrase	Compound Construction	Sentence	
below 10 words				
occurrences	**18**	**1**	**2**	**21**
% within length	**85.7%**	**4.8%**	**9.5%**	**100%**
% within structure	**8.2%**	**2.3%**	**5.4%**	**7.0%**
% total	**6.0%**	**0.3%**	**0.7%**	**7.0%**
between 10 and 19 words				
occurrences	**161**	**27**	**25**	**213**
% within length	**75.6%**	**12.7%**	**11.7%**	**100%**
% within structure	**73.5%**	**61.4%**	**67.6%**	**71.0%**
% total	**53.7%**	**9.0%**	**8.3%**	**71.0%**
between 20 and 25 words				
occurrences	**31**	**13**	**9**	**53**
% within length	**58.5%**	**24.5%**	**17.0%**	**100%**
% within structure	**14.2%**	**29.5%**	**24.3%**	**17.7%**
% total	**10.3%**	**4,3%**	**3.0%**	**17.0%**
more than 25 words				
occurrences	**9**	**3**	**1**	**13**
% within length	**69.2%**	**23.1%**	**7.7%**	**100%**
% within structure	**4.1%**	**6.8%**	**2.7%**	**4.3%**
% total	**3.0%**	**1.0%**	**0.3%**	**4.3%**
TOTALS				
occurrences	**219**	**44**	**37**	**300**
% within Structure	**73.0%**	**14.7%**	**12.3%**	**100%**
% within Length	**100%**	**100%**	**100%**	**100%**

Figure 4.1. Length of RA titles according to structure (N=300)

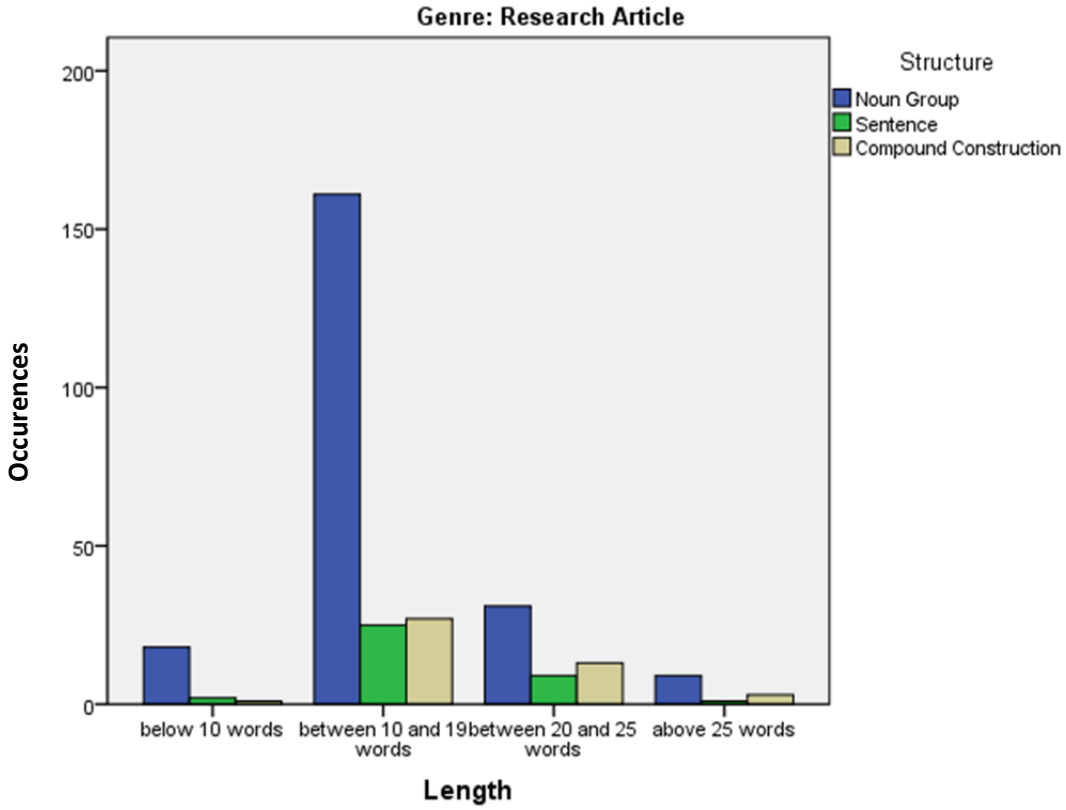
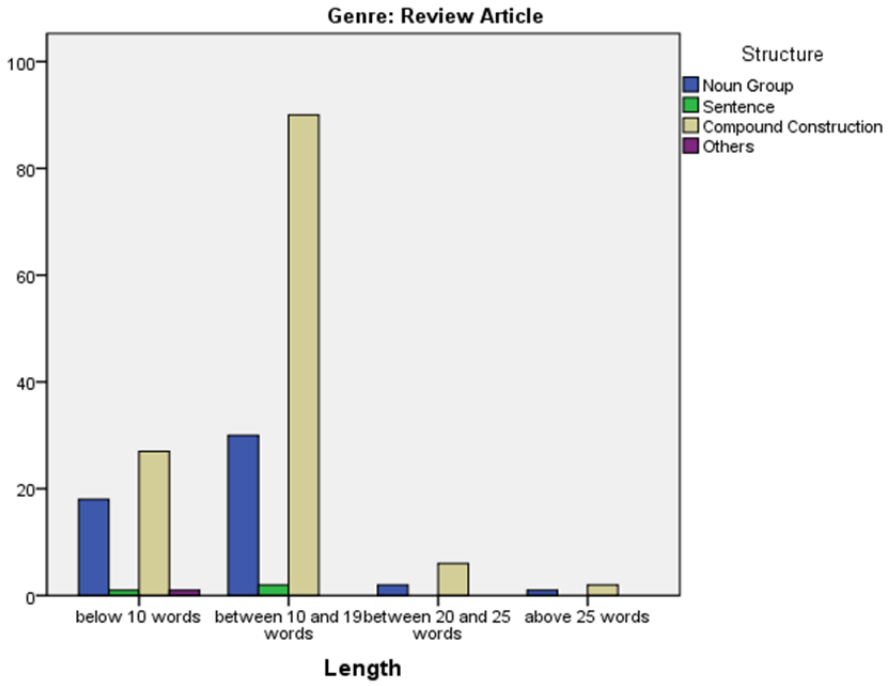


Table 4.3 shows that out of 180 review article titles, 122 (almost 70%) fell within the range of 10 and 19 word-length, coincidentally with RA titles. Out of those titles, however, 90 (73.8%) were Compound Constructions, that is, half the RVAs altogether, followed by Noun Phrase titles with 30 occurrences, representing 24.6% in the range. Second place took the range below 10 words, with 47 titles (26.1%), out of which 27 were Compound Construction (57.4%) and 18 were Noun Phrases (38.3%). The results here show that most RVAs are Compound Constructions of between 10 and 19 words, followed by Noun Phrases of the same word-length and Compound Construction and Noun Phrases of the range below 10 words respectively. In all, Tables 4.2 and 4.3 show a greater variety of constructions and lengths in RAs than in RVAs.

Table 4.3. Length of RVA titles according to structure (N=180)

RVA TITLE LENGTH	RVA TITLE STRUCTURE				TOTALS
	Noun Phrase	Compound Construction	Sentence	Others	
below 10 words					
occurrences	**18**	**27**	**1**	**1**	**47**
% within length	**38.3%**	**57.4%**	**2.1%**	**2.1%**	**100%**
% within structure	**35.3%**	**21.6%**	**33.3%**	**100%**	**26.1%**
% total	**10.0%**	**15.0%**	**0.6%**	**0.6%**	**26.1%**
between 10 and 19 words					
occurrences	**30**	**90**	**2**	**0**	**122**
% within length	**24.6%**	**73.8%**	**1.6%**	**0.0%**	**100%**
% within structure	**58.8%**	**72.0%**	**66.7%**	**0.0%**	**67.8%**
% total	**16.7%**	**50.0%**	**1.1%**	**0.0%**	**67.8%**
between 20 and 25 words					
occurrences	**2**	**6**	**0**	**0**	**8**
% within length	**25.0%**	**75.0%**	**0%**	**0.0%**	**100%**
% within structure	**3.9%**	**4.8%**	**0%**	**0.0%**	**4.4%**
% total	**1.1%**	**3.3%**	**0%**	**0.0%**	**4.4%**
more than 25 words					
occurrences	**1**	**2**	**0**	**3**	**3**
% within length	**33.3%**	**66.7%**	**0%**	**100%**	**100%**
% within structure	**2.0%**	**1.6%**	**0%**	**1.7%**	**1.7%**
% total	**0.6%**	**1.1%**	**0%**	**1.7%**	**1.7%**
TOTALS					
occurrences	**51**	**125**	**3**	**1**	**180**
% within Structure	**28.3%**	**69.4%**	**1.7%**	**0.6%**	**100%**
% within Length	**100%**	**100%**	**100%**	**100%**	**100%**
% total	**28.3%**	**69.4%**	**1.7%**	**0.6%**	**100%**

Figure 4.2. Length of RVA titles according to structure (N=180)



4.1.2. Lexical density

Table 4.4 shows the content or lexical/structure word content in both genres. As can be seen, total figures for RAs and RVAs show highly dense titles, with lexical words nearly tripling structure words. The following is an example of highly dense noun phrase titles:

(7). *Milk composition, milk fatty acid profile, digestion, and ruminal fermentation in dairy cows fed whole flaxseed and calcium salts of flaxseed oil* (18:4)

(See more examples of highly dense noun phrase titles in Appendix H.)

Table 4.4. Lexical Density expressed in terms of structure / lexical or content words per title in number of words and percentage (detail per journal in Appendix G)

GENRE	NUMBER OF WORDS	%
RA	**3423 : 1310**	**72.35 : 27.68**
RVA	**1628 : 681**	**70.87:29.64**

In RAs, the corpus presented 6 to be the most frequent difference between lexical/structure word number (56 instances), followed by 7 (49 instances), and 8 (44 instances). As for RVAs, the corpus showed 4 to be the most frequent difference between lexical/structure word number (31 instances), followed by 5 (26 instances), and 3 (25 instances).

The fact that Noun Phrase was the most recurrent title structure in my corpus (74%) would explain my results, since titles in scientific publications are intended to reflect the whole study they label or name, they are a text in themselves despite the relatively few words, and they represent the article as a whole, in the same way as an ambassador represents his or her country abroad: he or she is only *one person*, representing *millions of people* sharing certain territory and culture. This is an important role for the title to play with such a little number of words as compared with the whole article, hence its density.

Against the explicitness and lightness of commonsense, congruent language, scientific texts are extremely dense, obscure, and sometimes even ambiguous, unless you are an insider of the discipline. Titles are not an exception; I could experience these features myself when analyzing the corpus of the present study since, on several occasions, the ambiguity led me to recur to the experts in the field for clarification of concepts and ideas conveyed using every day, commonsense language. Knowledge of the language was not enough; knowledge of the discipline, or schema, was needed. Hence the importance of considering clarity and precision against ambiguity when writing a title, which was considered by Busch-Lauer (2000) and Goodman et al. (2000).

4. 1. 3. Word Frequency

Word frequency counts (Table 4.5) presented 4755 word tokens in RAs (1710 word types), and 2315 words tokens in RVA (875 word types). In both genres, the most frequent word is a structure word, namely, *of*, with 328 occurrences in RAs, and 147 occurrences in RVAs. This prominent occurrence of *of* in the corpus analyzed is in agreement with Haggan (2004) and Wang and Bai (2007), the latter also noting the appearance of *of* in combination with *effect*, among other words. Also in both genres, *of* was followed by *and*, with 256 occurrences in RA and 125 occurrences in RVAs. The ten most frequent structure words in RAs, thus, were *of, and, in, the, on, a, to, for, by,* and *from*, *in* being the second most frequently used preposition, coincidental with findings of Haggan (2004), while in RVAs, they are *of, and, in, the, a, for, on, to, from,* and *by*. We can see that they are the same in both genres with slight differences in number of occurrences.

The first most frequent content word in RA titles was *effects*, with 39 occurrences, followed by *dairy* and *effect*, both with 32 occurrences, and *production* with 29 occurrences. In RVA titles, the first most frequent content word was *review*, with 93 occurrences, followed by *dairy* with 38 occurrences and *invited* with 49 occurrences. The latter term may look weird for a RVA title since it is a non-technical word. Its high occurrence, however, is immediately understood if the following example is considered:

(8). *Invited review: current state of genetic improvement in dairy sheep*

In all, consideration of the first ten most frequent content words in RA titles, namely *effects, dairy, effect, production, cattle, cows, growth, yield, beef, grazing*, shows a reflection of the most frequent topics in the field of Animal Production, with an emphasis on the study of the effect(s) of something on something else (*effects, effect*), related to dairy and beef production (*dairy, production, beef*), animals considered in particular (*cows*) or as a group (*cattle*), some of the animals' activities (*grazing*), and some aspects of the animals' production (*yield, growth*).

On the other hand, the ten most frequent content words in RVA titles, namely *review, invited, dairy, cattle, production, milk, health, use, nutrition, role*, show, primarily, the need to identify the genre of the article (*review, invited*) among the most numerous type of article, i.e., the research, in the list of contents of the journals, as well

as the most frequent topics for revision, which agree with those of the RA to some extent (*dairy, milk, cattle, production*), plus other terms reflecting a more general consideration of the thematic area (*health, use, nutrition, role*).

Table 4.5. The 50 most frequent words in RA and RVA titles and number of occurrences

RESEARCH ARTICLES			**REVIEW ARTICLES**		
Total No. of Word Types: 1710			Total No. of Word Types: 875		
Total No. of Word Tokens: 4755			Total No. of Word Tokens: 2315		
1	328	of	1	147	Of
2	256	and	2	125	And
3	198	in	3	93	Review
4	105	the	4	92	In
5	86	on	5	78	The
6	49	a	6	58	A
7	45	to	7	49	Invited
8	42	for	8	38	Dairy
9	39	effects	9	33	For
10	32	dairy	10	33	On
11	32	effect	11	32	To
12	29	production	12	24	Cattle
13	27	by	13	18	Production
14	27	from	14	17	Milk
15	25	with	15	16	From
16	24	cattle	16	12	Board
17	23	cows	17	12	Health
18	22	growth	18	11	Use
19	21	yield	19	10	Nutrition
20	19	beef	20	10	Role
21	19	grazing	21	9	By
22	18	nitrogen	22	9	Gut
23	17	milk	23	9	Products
24	17	performance	24	8	Animal
25	13	as	25	8	Animals
26	13	crop	26	8	Beef
27	13	dry	27	8	Implications
28	13	during	28	7	Agricultural
29	13	l	29	7	Current
30	13	management	30	7	Effects
31	13	quality	31	7	Intake
32	12	genetic	32	7	Meat
33	12	or	33	7	Nutritional
34	12	pigs	34	7	Science
35	12	response	35	6	Acids
36	12	sheep	36	6	Effect
37	12	soil	37	6	Factors
38	11	bovine	38	6	Feeding
39	11	environmental	39	6	Food
40	11	fed	40	6	Function
41	11	feed	41	6	Growth
42	11	feeding	42	6	Livestock
43	11	is	43	6	Potential
44	11	pasture	44	6	Quality
45	11	soybean	45	6	Research
46	11	under	46	6	Species
47	10	acid	47	6	Systems
48	10	analysis	48	6	With
49	10	characteristics	49	5	Analysis
50	10	development	50	5	Application

Relating frequency of structure words and content words, we can see a direct relationship between *of* and *effect*, since the phrase *effect(s) of* is the most recurrent. Other phrases using *of* are *analysis of, evaluation of, comparison of, impact of, content of, performance of, utility of, response(s) of, assessment of, sustainability of, design of, development of, role of, use of,* and *estimation of*. The occurrence of these content words followed by *of* is in the role of head (heads are analyzed further in the present study). However, we can see that these words do not provide much information about the topic of the research in question. It is the subsequent prepositional phrases which informs the reader about the exact nature of the research, hence the occurrence of the other most frequent structure words. That is, the research work was about: the effects *of* what? *on* what? the analysis *of* what? the evaluation *of* what? etc., where? *(from, in, on)*, for what purpose? *(to, for)*, and by which method or which agent? (*by*).

4.2. The RA

4.2.1. The RA title structures

Table 4.6 shows quantitative data on the occurrence of the title structures considered in this study and characterized in Methods, Section 3.2., namely, Noun Phrase, Compound Construction, Sentence (affirmative and negative statements), and sentence (Question). (Detail per journal in Appendix I)

Table 4.6. RA title structures. Raw numbers and percentages (N=300)

RA TITLE STRUCTURES	RAW NUMBERS	PERCENTAGES
Noun Phrase	**221**	**74%**
Compound	**44**	**14.33%**
Sentence: Statements	**28**	**9.33%**
Sentence: Questions	**7**	**2.33%**
TOTAL	**300**	**100%**

As can be seen in Table 4.6 above, the Noun Phrase was the preferred structure, accounting for 74% of all titles (=221/300), which agrees with Haggan's findings for Science titles (2004), and Wang and Bai's (2007) for Medicine titles. This result agrees partly with Soler (2007), whose figures show agreement for the case of Medicine

(72%), but not for Biology and Biochemistry. In her study, the Full-Sentence structure was the preferred one (28% and 26% for Noun Phrases against 51% and 46% for full sentences). The following is an example of Noun Phrase RA title:

(9). *Effect of dietary distillers dried grains with solubles on indicators of oxidative stress and immune function in growing pigs*

The second most frequent structure of preference was the Compound Construction, accounting for 14.33% of all RA titles in the corpus (=44/300), which again is in agreement with Haggan (2004), whose findings show 21.5% of preference for this type of structure in Science titles. However, it does not agree with Soler (2007), who found that the Compound Construction is in a third position of preference after Noun Phrase and Full Sentence for Medicine (12%), Biology (5%) and Biochemistry (13%). The following is an example of Compound construction RA title:

(10). *Endometrial expression of leptin receptor and members of the growth hormone—Insulin-like growth factor system throughout the estrous cycle in heifers*

Last in the line of title construction preferences were Sentences (either affirmative or negative statements), accounting for 9.33%, and Questions, accounting for 2.33%. As to statements, my results agree with those of Haggan (2004) in percentages (8.5%). Berkenkotter and Huckin (1995), in their study of titles state that "it is becoming more and more common to find the results of an investigation stated (or strongly implied) in the title of an article" (p.33). I interpret this to mean that they just pointed to the *increase in the use* of this structure (from 0% in 1944 to 21% in 1989); but at the moment of their study, there was no suggestion that this structure kept on growing in terms of preference. The following are examples of Sentence RA titles:

(11). *Ovulatory activity of female goats adapted to the subtropics is responsive to photoperiod* (Sentence: Affirmative Statement)

(12). *Fatty acids do not stimulate enteroendocrine cells via particle sensing mechanisms* (Sentence: Negative Statement)

(13). *Does breed affect nursing and reproductive behavior in beef cattle?* (Sentence: Question)

What follows is a discussion of the results given above, in an attempt to explain the scientists' choices of the structures analyzed in the light of the theoretical framework of this thesis.

4.2.1.1. The Noun Phrase title

In order to understand the high preference of Noun Phrase titles of RAs over the others, it is interesting to explain the rationale behind this choice of language realization to express the scientific experience. It is clear that there is a movement or shift towards the concrete, towards 'packing' the experience, since this feature gives the scientific experience stability and permanence in time: actions, events, processes, are ephemeral; things, entities, remain. A curious paradox emerges here, as Halliday (1998a) notes: "that the most abstract theorizing is achieved by modeling everything into the concrete" (p. 48).

The importance of nominalizing, then, lies in the fact that science constitutes a theory built around a system of taxonomies of 'things', either metaphorical and virtual or really concrete, that can be studied, observed, analyzed, halfway between processes, qualities, and circumstances. The source of this feature goes back to the times when a new kind of knowledge started to emerge, characterized by 'experimentation', 'observation', and 'measurement', and which carried with its evolution the need for an evolution in the language expressing it, too (it is 'things' that can be 'measured', 'observed', 'experimented' upon).

In part, those 'things' that can be measured, observed, experimented upon, are realized in the forms of variables and aspects of the study (see Section 4.1.1 above).

4.2.1.2. The Compound Construction title

As shown in Table 4.6, Section 4.2.1 above, Compound Constructions took the second place of occurrence in type of title, following the Noun Phrase type. This second position deserves an analysis of what goes on at one side and the other of the colon. This analysis was made on four levels: structures, variables and aspects of the study, relationship between the parts at both sides of the colon, and how structures and relationship between parts relate.

4.2.1.2.1. Structures at one side and the other of the colon

In Methods, Section 3.2, a classification was given of the structures present at one side and the other of the colon, i.e., noun phrase + noun phrase, noun phrase + question, and noun phrase + statement (affirmative and negative). As Table 4.7 shows, there was a high preference for the combination noun phrase + noun phrase (40/44, that is, 90.9%), followed by noun phrase + question with just 6.8% and finally noun phrase + sentence with a bare 2.3%. The following are examples of these structures:

(14). *Optimum extent of barley grain processing and barley silage proportion in feedlot cattle diets: Growth, feed efficiency, and fecal characteristics* (noun phrase + noun phrase)

(15). *Sustainable, low-input, warm-season, grass–legume grassland mixtures: mission (nearly) impossible?* (noun phrase + question)

Table 4.7. Compound Construction of RA titles. Structures. Raw numbers and percentages

COMPOUND CONSTRUCTION RA TITLE. STRUCTURES	RAW NUMBERS	PERCENTAGES
noun phrase + noun phrase	**40**	**90.9%**
noun phrase + question	**3**	**6.8%**
noun phrase + statement	**1**	**2.3%**
TOTAL	**44 /300**	**100%**

4.2.1.2.2. Relationship between the two parts at one side and the other of the colon

As to the relationship between the two parts at one side and the other of the colon, that is, general : specific, topic : method, problem : solution, and major : minor (see Methods, Section 3.2. for a description and examples), my counts revealed a high occurrence of general : specific, with 28 occurrences out of 44, representing 63.6% of all Compound Construction titles, which agrees with the trend in Soler (2007) and with Busch-Lauer (2000) for all the titles in their corpora, irrespective of the discipline. In

the light of my counts, topic : method took the second place of preference with 9 occurrences, representing 20.5% of all Compound Construction titles (Table 4.8).

Table 4.8. Compound Construction titles of RAs. Relationship between parts. Raw numbers and percentages

COMPOUND CONSTRUCTION RA TITLE. RELATIONSHIP BETWEEN PARTS	RAW NUMBERS	PERCENTAGES
general : specific	**28**	**63.6%**
topic : method	**9**	**20.5%**
problem : solution	**1**	**2.3%**
major : minor	**6**	**13.6%**
TOTAL	**44 / 300**	**100%**

As I mentioned before, the most frequent structure was noun phrase + noun phrase, while the most frequent relationship between parts was general : specific. In terms of the correlation between these two categories (See Table 4.9), we can see that the relationship general : specific was mostly realized by the structure noun phrase + noun phrase, with a high occurrence of 89.3% (25 instances out of 44), followed far behind by the structure noun phrase + question with 7.1% (2 instances out of 44), and noun phrase + statement with 3.6% (1 instance out of 44). The following are examples of this co-relation:

(16). *Crop rotations in Argentina: Analysis of water balance and yield using crop models.* (general : specific RA title as realized by noun phrase + noun phrase structure)

(17). *Sustainable, low-input, warm-season, grass-legume, grassland mixtures: mission (nearly) impossible?* (general : specific RA title as realized by noun phrase + question)

(18). *How resource poor households value and access poultry: Village poultry keeping in Tigray, Ethiopia* (general - specific RA title as realized by noun phrase + statement)

The cases of the relationship topic : method were entirely realized by the structure noun phrase + noun phrase, while the relationship problem : solution was entirely

realized by the structure noun phrase + question, and finally, the relationship major : minor was entirely realized by the structure noun phrase + noun phrase. The following are examples of this co-relation:

(19). *Energy consumption, greenhouse gas emissions and economic performance assessments in French Charolais suckler cattle farms: Model-based analysis and forecasts* (topic : method RA title as realized by noun phrase + noun phrase)

(20). *Increasing incomes of Malian cotton farmers: Is elimination of US subsidies the only solution?* (problem : solution RA title as realized by noun phrase + question)

(21). *Recruitment of Phalaris aquatica within existing swards. 1. Effects of biomass manipulation, seed level modification and site preparation* (major : minor RA title as realized by noun phrase + noun phrase)

4.2.1.2.3. Correlation between structures and relationship between parts

Thus, the distribution of the structure noun phrase + noun phrase in the category relationship between parts is 62.5% in general : specific, 22.5% in topic : method, and 15% in major : minor. Problem : solution is the only relationship not realized by noun phrase + noun phrase structure.

It is interesting to note the prevailing presence of Noun Phrases in all Compound Construction structures, which, together with their presence in Noun Phrase titles, points to the importance of this grammatical structure in my corpus.

Table 4.9. Compound Construction titles of RA. Relationship between structures and parts. Raw numbers and percentages

COMPOUND CONSTRUCTION RA TITLE. STRUCTURES	RELATIONSHIP BETWEEN PARTS				TOTAL
	general : specific	topic : method	problem : solution	major : minor	
noun phrase + noun phrase	**25**	**9**	**0**	**6**	**40**
% within Structure	**62.5%**	**22.5%**	**0%**	**15%**	**100%**
% within Relationship between parts	**89.3%**	**100%**	**0%**	**100%**	**90.9%**
noun phrase + question	**2**	**0**	**1**	**0**	**3**
% within Structure	**66.7%**	**0%**	**33.3%**	**0%**	**100%**
% within Relationship between parts	**7.1%**	**0%**	**100%**	**0%**	**6.8%**
noun phrase + statement	**1**	**0**	**0**	**0**	**1**
% within Structure	**100%**	**0%**	**0%**	**0%**	**100%**
% within Relationship between parts	**3.6%**	**0%**	**0%**	**0%**	**2.3%**
TOTAL	**28**	**9**	**1**	**6**	**44**
% within Structure	**63.6%**	**20.5%**	**2.3%**	**13.6%**	**100%**
% within Relationship between parts	**100%**	**100%**	**100%**	**100%**	**100%**

4.2.1.3. The Sentence title

Last in the line of preference of types of titles is Sentence, with a high occurrence of Statements (80%) over Questions (see Table 4.10). Questions refer to the results, but in an indirect way: the scientist reader should read further, look for the answer to the question of the title, and thus, the results in the study. Statements, on the other hand, either affirmative or negative, also refer to the results, but they express them directly; the title anticipates the main results of the study. The huge mass of literature that the scientist reader faces in his or her bibliographic search would explain the high preference for a type of title that goes to the point in terms of expression of results.

It would appear that in Animal Production, precision that allows for an easy indexation and addressing the right reader would predominate over the need to promote the article, hook the reader's attention, and establish a dialogic tone with the reader, which would not agree with Hyland's (2002b) or Ball's (2009) findings.

Curiously, all sentence titles show categorical assertions, “confident, unqualified, … presented as statements of fact”, in the words of Haggan (2004, p. 4), especially when I consider that scientific language features cautious claims highly marked by hedges, which seems not be the case with the sentence titles of my corpus. Interesting too, and in line with Haggan’s (2004) and Soler’s (2007) findings, the use of the simple present tense was detected in all sentence titles of my corpus, a feature indicating an emphasis on the timeless certainty of the general findings.

The fact that Sentences imply a strong commitment towards the expression of results and that the Noun Phrase and the Compound Construction allow for more detachment would explain the preference for the last two title structures by Animal Production researchers.

Table 4.10. Sentence titles of RA. Raw numbers and percentages

SENTENCE RA TITLES	RAW NUMBERS	PRECENTAGES
Statement (aff. and neg.)	**28**	**80%**
Question	**7**	**20%**
TOTAL	**35 /300**	**100%**

4.2.2. Heads in RA titles

In this section, I analyze heads of RA titles taking into account number of heads in Noun Phrase titles (Section 4.2.2.1), types of heads in all structures of titles (Section 4.2.2.2, (see Section 3.1.2. for a description and examples of six head subcategories), and finally, a correlation between types of head and structures of titles (Section 4.2.2.3).

4.2.2.1. Number of heads in Noun Phrase titles of RAs

In terms of number of heads in Noun Phrase titles, Table 4.11 shows that 81.3% of titles are 1-head titles, a high occurrence (178 out of 219), which agrees with Wang and Bai (2007), whose findings revealed a prevalence of uni head noun Phrase in Medicine titles with 74.6%. Two-head titles followed far behind with 14.2%, which corresponds to 31 titles out of 219.

Table 4.11. Number of heads in Noun Phrase titles of RA. Raw numbers and percentages

NOUN PHRASE TITLES OF RA NUMBER OF HEADS	1 head	2 heads	3 heads	4 heads	TOTAL
RAW NUMBERS	178	31	7	3	219
PERCENTAGES	81.3%	14.2%	3.2%	1.4%	100%

The following are examples of uni head and two head RA titles:

(22). *The expected utility of genetic information in beef cattle production* (1-head Noun Phrase. Head: *utility*)

(23). *Performance and total-tract digestibility responses to exogenous xylanase and phytase in diets for growing pigs* (2-head Noun Phrase. Heads: *performance* and *digestibility*)

4.2.2.2. Types of heads in all title structures of RAs

As to types of heads (see Table 4.12), my counts show a high occurrence of "general classifying words that describe the results", with 61.3% which represents 184 titles out of 300, followed by "general classifying words that describe the action taken" with 21.7%, representing 65 titles out of 300.

Table 4.12. Types of headwords in RA titles. Raw numbers and percentages

TYPES OF HEADWORDS IN RA TITLES	general classifying words that describe the action taken	general classifying words that describe the results	verbal nouns describing a particular process	nouns describing property	nouns describing object of study	combination	TOTAL
RAW NUMBERS	65	184	7	6	12	26	300
PERCENTAGES	21.7%	61.3%	2.3%	2%	4%	8.7%	100%

The following are examples of the most recurrent types of head in RAs:

(24). *Effects of stocking rate on pasture production, milk production and reproduction of supplemented crossbred Holstein–Jersey dairy cows grazing lucerne pasture* (head type: general classifying word that describes the results: *effects*)

(25). *A comparison of the protective action of added egg yolks from five avian species to the cryopreservation of bull sperm* (head type: general classifying word that describes the action taken: *comparison*)

4.2.2.3. Correlation between types of head and title structures of RAs

The distribution of these figures in the different title structures can be seen in Table 4.13. In all title structures, “general classifying words that describe the results” present the highest frequency, followed by “general classifying words that describe the action taken”. In particular, Sentence titles present a high 94.6% for the headword type “general classifying words that describe the results”, but just 5.4% for “general classifying words that describe the action taken”. No other type of headword occurs in this title structure of our corpus. Compound Construction titles present 61.4% for the former and 22.7% for the latter. Far behind we found “nouns describing object of study” with 9.1%, “combination” with 4.5%, and “verbal nouns describing a particular process” with 2.3%. In my corpus, this title structure presented no occurrence of “nouns describing property”. Noun Phrase titles, the most frequent type of RA title structure, presented 55.7% for the former and 24.2% for the latter, followed by “combination”, with 11%, “nouns describing object of study” with 3.7%, and both “nouns describing property” and “verbal nouns describing a particular process” with 2.7%.

As Table 4.13 reveals, Noun Phrase titles presented the highest variety of headword types, followed by Compound Construction, which showed no occurrence of “nouns describing property”. Sentence titles showed the least variety of headword titles, with no occurrences of either “combination”, “verbal nouns describing a particular process”, “nouns describing object of study”, or “verbal nouns describing a particular process”.

This would indicate that the structure of the title is related to the type of headword; Noun Phrase titles seem suitable for highlighting either results, actions taken, properties, objects of study, or processes, while Sentence titles seem to be more appropriate for highlighting systems and results, and Compound Constructions falling somewhere between the two, nearer Noun Phrase titles. Noun Phrase titles would seem to be a more flexible structure regardless of the nature of the study and the aspect(s) the researcher wants to emphasize in the title.

Table 4.13. How types of heads and structures of titles of RA titles relate. Raw numbers and percentages

STRUCTURE OF RA TITLES	TYPES OF HEADWORDS						TOTAL
	general classifying words that describe the action taken	general classifying words that describe the results	verbal nouns describing a particular process	nouns describing property	nouns describing object of study	combination	
Noun Phrase	**53**	**122**	**6**	**6**	**8**	**24**	**219**
% within Structure	**24.2%**	**55.7%**	**2.7%**	**2.7%**	**3.7%**	**11%**	**100%**
% within Headwords	**81.5%**	**66.3%**	**85.7%**	**100%**	**66.7%**	**92.3%**	**73%**
Sentence	**2**	**35**	**0**	**0**	**0**	**0**	**37**
% within Structure	**5,4%**	**94,6%**	**0%**	**0%**	**0%**	**0%**	**100%**
% within Headwords	**3.1%**	**19%**	**0%**	**0%**	**0%**	**0%**	**12.3%**
Compound Construction	**10**	**27**	**1**	**0**	**4**	**2**	**44**
% within Structure	**22.7%**	**61.4%**	**2.3%**	**0%**	**9.1%**	**4.5%**	**100%**
% within Headwords	**15.4%**	**14.7%**	**14.3%**	**0%**	**33.3**	**7.7%**	**14.7%**
TOTAL	**65**	**184**	**7**	**6**	**12**	**26**	**300**
% within Structure	**21.7%**	**61.3%**	**2.3%**	**2%**	**4%**	**8.7%**	**100%**
% within Headwords	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Up to this point, I dealt with number of heads of Noun Phrase titles in particular and types of headwords, and I correlated all title structures with types of headwords. It is also interesting to know what happens at one side and the other of the headword in uni-head Noun Phrase titles, this being the most frequent Noun Phrase title in terms of number of heads. At this point, I will proceed to the analysis of modification in RA titles (Section 4.2.3): I analyze number of pre and post modifiers (Section 4.2.3.1) as well as post modification structures (Section 4.2.3.2).

4.2.3. Modification in RA titles

4.2.3.1. Number of pre and post modifiers

As can be seen from Table 4.14, uni head Noun Phrase titles present either post modification only (51.1%) or both pre and post modification (48.9%); none of the titles in my corpus presented pre modification only.

Table 4.14. Modification in uni head Noun Phrase titles of RA. Raw numbers and percentages

UNI HEAD NOUN PHRASE RA TITLES. TYPE OF MODIFICATION	Head with pre modification only	Head with post modification only	Head with pre and post modification	TOTAL
RAW NUMBERS	**0**	**91**	**87**	**178**
PERCENTAGES	**0%**	**51.1%**	**48.9%**	**100%**

As regards number of post modifiers in particular (Table 4.15), my corpus presented a range of 1 to 5 post modifiers; half of the uni head Noun Phrases titles (48.9%) presented 3 post modifiers, followed by titles presenting 2 post modifiers (30.9%). These figures could be related to the variables and aspects of the study accompanying the head. Consider this (the order of some components may vary):

Head **+** animal / crop / substance involved + function, feature or condition of the animal / crop / substance + objective or geographical location (3 post modifiers)

(26). *Short-term responses + of a Stipagrandis/Leymuschinesis community + to frequent defoliation + in the semi arid grasslands of Inner Mongolia, China*

Head + method + objective + animal / crop / substance involved (3 post modifiers)

(27). *Use of + double-choice feeding + to quantify feed ingredient preferences + in pigs*

(28). *Evaluation + of PCR-based typing methods + for the identification of probiotic Enterococcus faecium strains + from animal feeds*

Head + system + objective or geographical location + animal / crop / substance involved (3 post modifiers)

(29). *The environmental performance + of milk production + on a typical Portuguese dairy farm*

(30). *Sustainability + of dairy farming system + in Tuscany + in a changing climate*

Head + animal / crop / substance involved + function, feature or condition of the animal / crop / substance (2 post modifiers)

(31). *Survival + of plants of common soinfoin (Onobrychisviciifolia Scop.) + in competition with two companion grass species*

(32). *Herbage growth rates + on heterogeneous swards + as influenced by sward-height classes*

Head + system + objective or geographical location (2 post modifiers)

(33). *Soil fertility dynamics + in runoff-capture agriculture, Canary Islands, Spain*

Table 4.15. Modification in uni head Noun Phrase titles of RAs: Number of post modifiers. Raw numbers and percentages

UNI HEAD NOUN PHRASE RA TITLES. NUMBER OF POST MODIFIERS	**1 post modifier**	**2 post modifiers**	**3 post modifiers**	**4 post modifiers**	**5 post modifiers**	**TOTAL**
RAW NUMBERS	**13**	**55**	**86**	**22**	**2**	**178**
PERCENTAGES	**7.3%**	**30.9%**	**48.9%**	**12.4%**	**1.1%**	**100%**

4.2.3.2. Post modification structures

As already described and exemplified in Section 3.2., post modification structures of uni head Noun Phrase titles in my corpus feature prepositional group, past participle clauses, to-infinitive clauses, present participle clauses, and noun phrases. More than two thirds of the titles (73.6%) are modified entirely by prepositional groups, while the rest (26.4%) are modified by a combination of all the structures mentioned above. It is out of the scope of this study to analyze how the different structures combine in this category.

The Noun Phrase title seems to be an ideal structure to map the specificity of the study in the corresponding field, with its head as the center and its complementing information to the left and to the right with pre and post modification mostly realized by

prepositional phrases, but also allowing for an array of other structures, which gives this title structure great structural flexibility and diversity. This feature provides Noun Phrase titles with "a precision and explicitness in pinpointing the exact focus of the research", which "is efficiently achieved through the use of both pre and post modification" (Haggan, 2004, p. 20).

In Section 4.1. I dealt with title length and lexical density of both genres. In Section 4.2 I presented and analyzed results of RA titles. In the following Section (4.3), I present and discuss the RVA results in comparison with RA as follows: Section 4.3.1 deals with RVA title structures. Section 4.3.2 deals with heads: I analyze number of heads in Noun Phrase titles (Section 4.3.2.1), types of heads in all title structures (Section 4.3.2.2), and correlation between types of head and title structures (Section 4.3.2.3). Section 4.3.3 deals with modification in uni head Noun Phrase titles: number of pre and post modifiers (Section 4.3.3.1), post modification structures (Section 4.3.3.2), and correlation between types of heads and post modification structure of uni head Noun Phrase titles (Section 4.3.3.3).

4.3. The RVA

4.3.1. The RVA title structures

Table 4.16 shows basic quantitative data on occurrence of the title structures considered in this study and characterized in Methods, Section 3.2., namely, Noun Phrase, Compound Construction, Sentence (affirmative and negative Statements), and Sentence (Question). (Detail per journal in the Appendix)

Table 4.16. RVA title structures. Raw numbers and percentages (N=180)

RVA TITLE STRUCTURES	RAW NUMBERS	PERCENTAGES
Compound Construction	**125**	**69.44%**
Noun Phrase	**51**	**28.33%**
Sentence: Questions	**2**	**1.11%**
Sentence: Statements	**1**	**0.55%**
Others	**1**	**0.55%**
TOTAL	**180**	**100%**

As can be seen in Table 4.16 above, Compound Construction was the most frequent structure of RVA titles, with 69.44%, which represents 125 titles out of 180, followed by Noun Phrase with 28.33% representing 51 titles out of 180. This finding does not coincide with Soler (2007), whose counts show the Noun Phrase structure to be the most recurrent both in terms of disciplines and genres (Medicine 46%, Biology 66% and Biochemistry 53%, these disciplines being epistemologically close to the discipline selected in this study), and Compound Construction titles taking the second place (Medicine 40%, Biology 26% and Biochemistry 46%). Compared to RA title structure preference, the case is just the opposite: Noun Phrase took first place with 74% while Compound Construction took second place with 14.33%. The reasons for this difference in preference between the two genres will be understood in the light of the aspects analyzed in 4.3.1.1. As to Sentence, my findings show just 1 instance of Statements and 2 instances of Questions, representing 1.66% of my corpus, while Soler's findings show no instances of Statements but one instance of Questions in Medicine and one instance in Biology, representing 6% each of her corpus. Compared to RA results, there is a coincidence in the lower occurrence of both structures pertaining to Sentence, but showing a higher occurrence for both altogether, with 28 instances of Statements and 7 instances of Questions, which represent 11.66% of the corpus. The following are examples of the most recurrent title structures for RVAs:

(34). *Enzyme production by solid-state fermentation: Application to animal nutrition* (Compound Construction)

(35). *Integrating woody species into livestock feeding in the Mediterranean areas of Europe* (Noun Phrase)

4.3.1.1. The Compound Construction title

In order to understand the high preference of Compound Construction for RVA titles over the others, in this section I deal with what occurs at both sides of the colon, namely structures, relationship between parts, and how these two aspects co relate.

4.3.1.1.1. Structures at one side and the other of the colon

As Table 4.17 shows, the most frequent structure was noun phrase + noun phrase, with a high occurrence of 92% representing 115 titles out of 180, followed far behind

by noun phrase + question, with 4% representing 5 titles out of 180. These findings are coincidental with my counts of RA titles. Again, the RVA titles of my corpus show more heterogeneity than the RA titles, since the category "Others" takes third place, a feature of this genre in particular and representing 4 instances (3.2%) of the structure noun phrase + prepositional phrase. Once more, the low occurrence of this category, however, is not indicative of a particular trend in the genre.

Table 4.17. Compound Construction titles of RVA. Structures. Raw numbers and percentages

COMPOUND CONSTRUCTION RVA TITLES. STRUCTURES	RAW NUMBERS	PERCENTAGES
noun phrase + noun phrase	**115**	**92**
noun phrase + question	**5**	**4**
others(*)	**4**	**3.2**
noun phrase + statement	**1**	**0.8**
TOTAL	**125/180**	**100**

(*): noun phrase – prepositional phrase

The following are examples of the most frequent structures at one side and the other of the colon in RVA titles:

(36). *Water use efficiency of crops cultivated in the Mediterranean region: Review and analysis* (noun phrase + noun phrase)

(37). *How does research addresses the design of innovative agricultural production systems at the farm level? A review* (noun phrase + question)

(38). *Whey and whey proteins – From 'gutter to gold'* (others: noun phrase + prepositional phrase)

4.3.1.1.2. Relationship between parts

In terms of relationship between parts (see Table 4.18), my counts show a high occurrence of genre : topic with 79.2% representing 99 instances out of 180, followed by general : specific with 16.8% representing 21 instances out of 180. We can see, then, that genre : topic, a feature exclusive of RVA, displaces general : specific to a second

place from the first one in the case of RA titles where, as expected, there is no occurrence of genre : topic. This finding evidences the highly occurring feature of RVA containing a reference to the genre in the title name, which results in a practical guide for researchers, since it makes both the bibliographic search and the indexation easier endeavors.

Table 4.18. Compound Construction titles of RVAs. Relationship between parts. Raw numbers and percentages.

COMPOUND CONSTRUCTION RVA TITLE. RELATIONSHIP BETWEEN PARTS	RAW NUMBERS	PERCENTAGES
genre : topic	**99**	**79.2**
general : specific	**21**	**16.8**
topic : method	**2**	**1.6**
Others	**2**	**1.6**
major : minor	**1**	**0.8**
TOTAL	**125**	**100**

The following are examples of the most recurrent relationship between the parts of RVA titles:

(39). *INVITED REVIEW: Animal science departments of the future* (genre : topic)

(40). *Control of the estrous cycle to improve fertility to fixed-time artificial insemination in beef cattle: a review* (genre : topic)

(41). *Lactose: Crystallization, hydrolysis, and value-added derivatives* (general : specific)

4.3.1.1.3. Correlation between structures and relationship between parts

But how do these two aspects (structures and relationship between parts) of Compound Construction titles co relate? As mentioned above, the most frequent structure was noun phrase + noun phrase, and the most frequent relationship between parts was genre : topic. Table 4.19 shows that genre : topic was mostly realized by noun

phrase + noun phrase (=96%). Far behind, second place in realizing genre : topic was noun phrase + question with 3%. The following are examples of these co relations:

(42). *Genetics of adaptation in domestic farm animals: A review* (genre : topic as realized by the structure noun phrase + noun phrase)

(43). *Are adaptations present to support dairy cattle productivity in warm climates?* (genre : topic as realized by the structure noun phrase + question)

As to general : specific, the second most recurrent relationship between parts, it was mostly realized by the structure noun phrase + noun phrase with 81% representing 17 instances out of 21. This co-relation is coincidental with RA titles. The following is an example of this co-relation:

(44). *Essential oils in poultry nutrition: Main effects and modes of action* (general : specific as realized by noun phrase + noun phrase)

Far behind followed noun phrase + question with 9.5% representing just 2 instances out of 21, and noun phrase + statement with 4.8% representing just 1 instance out of 21. Thus, coincidental with RA titles, noun phrase + noun phrase was the most recurrent structure and its distribution in the different relationships between parts was as follows: 82.6% realizing genre : topic, 14.8% realizing general + specific, 1.7% realizing topic : method, and 0.9% realizing major : minor.

Table 4.19. Compound Construction titles of RVAs. Relationship between structures and parts. Raw numbers and percentages

COMPOUND CONSTRUCTION RVA TITLE. STRUCTURE	**RELATIONSHIP BETWEEN PARTS**					**TOTAL**
	general : specific	**topic : method**	**major : minor**	**genre : topic**	**others**	
noun phrase + noun phrase	**17**	**2**	**1**	**95**	**0**	**115**
% within Structure	**14.8%**	**1.7%**	**0.9%**	**82.6%**	**0%**	**100%**
% within Relationship between parts	**81%**	**100%**	**100%**	**96%**	**0%**	**92%**
noun phrase + question	**2**	**0**	**0**	**3**	**0**	**5**
% within Structure	**40%**	**0%**	**0%**	**60%**	**0%**	**100%**
% within Relationship between parts	**9.5%**	**0%**	**0%**	**3%**	**0%**	**4%**
noun phrase + statement	**1**	**0**	**0**	**0**	**0**	**1**

% within Structure	**100%**	**0%**	**0%**	**0%**	**0%**	**100%**
% within Relationship between parts	**4.8%**	**0%**	**0%**	**0%**	**0%**	**0.8%**
Others	**1**	**0**	**0**	**1**	**2**	**4**
% within Structure	**25%**	**0%**	**0%**	**25%**	**50%**	**100%**
% within Relationship between parts	**4.8%**	**0%**	**0%**	**1%**	**100%**	**3.2%**
TOTAL	**21**	**2**	**1**	**99**	**2**	**125**
% within Structure	**16.8%**	**1.6%**	**0.8%**	**79.2%**	**1.6%**	**100%**
% within Relationship between parts	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

4.3.1.2. The Noun Phrase title

As shown in Table 4.17 above, Noun Phrase titles in RVAs took second place after Compound Construction, with 28.33% of occurrence. Noun phrases and nominalization were thoroughly discussed in 4.2.1.1 above, as well as in 4.2.1.2.3, pointing to the importance of this structure throughout the whole corpus.

4.3.2. Heads in RVA titles

In this section, I analyze heads of RVA titles taking into account number of heads in Noun Phrase titles (Section 4.3.2.1), types of heads in all structures of titles (Section 4.3.2.2; see Section 3.2, six subcategories of heads above, for a description and examples of types of headwords), and finally, a correlation between types of head and structures of titles (Section 4.3.2.3).

4.3.2.1. Number of heads in Noun Phrase titles of RVAs

Table 4.20 shows that almost two thirds of Noun Phrase titles (=64.7%) were 1-head, representing 33 titles out of 51, while almost the remaining third corresponded to 2-head Noun Phrase titles. Only 2 titles out of 51 were 3-head, and no occurrence of 4-head Noun Phrase titles was present in my corpus. RA titles showed a more even distribution, with instances in all head numbers, but coincidental with RVA in more instances of 1-head followed by 2-head titles (see Section 4.2.2.1). The following are examples of uni head and two head Noun Phrase RVA titles:

(45). ***Pathways*** *for integration of biodiversity conservation into New Zealand's agricultural production* (1-head Noun Phrase)

(46). ***Genomics*** *and high-throughput screening* ***approaches*** *for optimal flavor production in dairy fermentation* (2-head Noun Phrase)

Table 4.20. Number of heads in Noun Phrase titles of RVA. Raw numbers and percentages.

NOUN PHRASE RVA TITLES. NUMBERS OF HEADS	1 head	2 heads	3 heads	4 heads	TOTAL
RAW NUMBERS	33	16	2	0	51
PERCENTAGES	64.7%	31.4%	3.9	0%	100%

4.3.2.2. Types of head in all structures of RVAs

As to types of head (see Table 4.21), “nouns denoting or implying genre” is the most recurrent with 60.6% representing 109 instances out of 180, followed by “general classifying words that describe the results” with 22.2% representing 40 titles out of 180. Once again, an aspect of the RVA title that makes reference to the genre takes first place of occurrence, displacing other aspects to a lower frequency of occurrence. This displacement marks the difference with results for RA titles, where, as expected, no instances of “nouns denoting or implying genre” occur, while “general classifying words that describe the results” takes first place with 61.3%, followed by “general classifying words that describe the action taken” with 21.7%. As is the case with RA, but with a lower percentage, “combination” takes the third place with 7.2%, followed close by “nouns describing object of study” with 5.6%. Curiously, “general classifying words that describe the action taken” show a very low occurrence of 3.3%.

Table 4. 21. Types of headwords in RVA. Raw numbers and percentages

Types of headwords	general classifying words that describe the action taken	general classifying words that describe the results	verbal nouns describing a particular process	nouns describing object of study	nouns denoting or implying genre	Combination	TOTAL
Raw numbers and percentages	6 3.3%	40 22.2%	2 1.1%	10 5.6%	109 60.6%	13 7.2%	180 100%

The following are examples of the most recurrent head types in RVA titles:

(47). *A **review** of factors that impact on the capacity of beef cattle females to conceive, maintain a pregnancy and wean a calf—Implications for reproductive efficiency in northern Australia* (noun denoting genre)

(48). *Facing up to the paradigm of ecological intensification in agronomy: **Revisiting** methods, concepts and knowledge* (noun implying genre)

(49). *Enzyme production by solid-state fermentation: **Application** to animal nutrition* (general classifying words that describe the result)

An interesting aspect to consider about the most recurrent type of head is the use of nouns implying the genre review article, that is, the use of terms other than *review*: *perspective, revisiting, (recent) advances, (current) knowledge, (past) lessons, developments, (historical) aspects, (current) concepts, (65) years, progress and challenges, issues and (possible) solutions, progress (so far),* which shows an alternative creative way of pointing the genre of the article to the reader in the mass of RAs.

4.3.2.3. Correlation between types of head and title structures of RVAs

The distribution of these figures in the different title structures can be seen in Table 4.22. “Nouns denoting or implying genre”, the most frequent type of head, shows a high occurrence of 91.7% in Compound Construction titles, which is the most frequent title structure. This type of head occurs also in Noun Phrase titles with a low 8.3%. No occurrence of this type is present either in Sentence or Others. As to RAs, “general classifying words that describe the results”, the most frequent type of head, occurs mostly in Noun Phrase with 66.3%, the most frequent title structure, and with lower percentages in all remaining title structures. Half the titles of the type “General classifying words that describe the results”, the second most frequent type of head, occurs in Noun Phrase titles and 42.5% in Compound Construction titles. Second place in RA titles takes “general classifying words that describe the action taken”, occurring in 81.5% in Noun Phrase titles and with lower percentages in the remaining title structures. “Combination” of head types shows 69.2% in Noun Phrase and 23.1% in Compound Construction titles. The remaining 7.7% occurs in the structure Others, which presents no other type of headword. As to RA titles, “Combination” of head

types shows 92,3% of occurrence in Noun Phrase, no occurrence in Sentence, and the remaining 7.7% in Compound Construction.

Table 4.22. Relationship between types of heads and structures of titles of RA. Raw numbers and percentages.

STRUCTURE OF RVA TITLES	TYPES OF HEADWORDS						TOTAL
	general classifying words that describe the action taken	general classifying words that describe the results	verbal nouns describing a particular process	nouns describing object of study	nouns denoting or implying genre	combination	
Noun Phrase	**5**	**20**	**2**	**6**	**9**	**9**	**51**
% within Structure	**9.8%**	**39.2%**	**3.9%**	**11.8%**	**17.6%**	**17.6%**	**100%**
% within Headwords	**83.3%**	**50%**	**100%**	**60%**	**8.3%**	**69.2%**	**28,9%**
Sentence	**0**	**3**	**0**	**0**	**0**	**0**	**3**
% within Structure	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**	**100%**
% within Headwords	**0%**	**7.5%**	**0%**	**0%**	**0%**	**0%**	**1.7%**
Compound Construction	**1**	**17**	**0**	**4**	**100**	**3**	**125**
% within Structure	**0.8%**	**13.6%**	**0%**	**3.2%**	**80%**	**2.4%**	**100%**
% within Headwords	**16.7%**	**42.5%**	**0%**	**40%**	**91.7%**	**23.1%**	**69.4%**
Others	**0**	**0**	**0**	**0**	**0**	**1**	**1**
% within Structure	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**	**100%**
% within Headwords	**0%**	**0%**	**0%**	**0%**	**0%**	**7.7%**	**0.6%**
TOTAL	**6**	**40**	**2**	**10**	**109**	**13**	**180**
% within Structure	**3.3%**	**22.2%**	**1.1%**	**5.6%**	**60.6%**	**7.2%**	**100%**
% within Headwords	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

4.3.3. Modification in uni head Noun Phrase titles

In Section 4.3.2., I dealt with different aspects of heads: number of heads of Noun Phrase titles, types of head in all title structures, and how type of title co relates with title structure. Although my counts reveal that Noun Phrase is the second RVA title structure of preference after Compound Construction, in this section I will analyze what

happens at one side and the other of the head in uni head Noun Phrase titles, since it has proven to be such a powerful resource for making meaning in my corpus as a whole.

4.3.3.1. Number of pre and post modifiers in RVA titles

In terms of number of pre and post modifiers (see Table 4.23), this type of title showed a fairly even distribution between "head with post modification only" with 45.5%, representing 15 out of 33 titles, and "head with pre and post modification" with 51.5%, representing 17 titles out of 33. This distribution is coincidental with RA, the only difference being that RVA titles present one instance of head with pre modification only (=3%), showing again more variety of modification as compared to RA titles, which show no instances of the latter.

Table 4. 23. Modification in uni head Noun Phrase titles of RVA.

UNI HEAD NOUN PHRASE RVA TITLES. TYPES OF MODIFICATION	Head with pre modification only	Head with post modification only	Head with pre and post modification	TOTAL
RAW NUMBERS	**1**	**15**	**17**	**33**
PERCENTAGES	**3%**	**45.5%**	**51.5%**	**100%**

The following are examples of heads with pre and post modification, and heads with post modification only: (modification in bold):

(50). ***Postpartum uterine*** *infection* ***in cattle*** (head with pre and post modification)

(51). *Influence* ***of glyphosate-resistant cropping systems on weed species shifts and glyphosate-resistant weed populations*** (head with post modification only)

As to number of post modifiers (Table 4.24), RVA titles show less variety than RA titles, since no instances of 4 and 5 post modifiers were found in my corpus. Almost half the titles present 2 post modifiers (=40.6%) representing 13 titles out of 32, while little more than 1/3 of the titles (=34.4%), representing 11 titles out of 32, present 3 post modifiers. This generic difference could be related to the fact that piling up variables or aspects of a specific study is a feature of RA as a practical guide to the reader in terms of deciding whether the study is of his or her interest or not, while the RVA, being more

related to how the study of certain topic evolved along a period of time, requires less specification of variables, since it represents an umbrella genre covering a number of studies on certain topic along time.

Table 4.24. Modification in uni head Noun Phrase titles of RVA: Number of post modifiers

UNI HEAD NOUN PHRASE RVA TITLES. NUMBER OF POST MODIFIERS	1 post modifier	2 post modifiers	3 post modifiers	4 post modifiers	5 post modifiers	TOTAL
RAW NUMBERS	8	13	11	0	0	32
PERCENTAGES	25%	40.6%	34.4%	0%	0%	100%

4.3.3.2. Post modification structures of RVA titles

But what kinds of post modifiers are represented in these figures? Most post modifiers are realized as “prepositional group” in 78.1% of occurrence which represents 25 out of 32 titles, followed by “combination” in 18.8% of occurrence representing 6 titles out of 32. These figures are similar to those of post modification in RA titles. More variety of post modification in RVA would be represented in 3.1% post modification realized as Noun Phrase. The following are examples of number of post modifiers and kinds of post modifiers (modifiers in bold):

(52). *A review* ***of population data utilization + in beef cattle research*** (two modifiers realized by prepositional groups)

(53). *Use* ***of nisin and other bacteriocins + for preservation + of dairy products*** (three modifiers realized by prepositional groups)

(54). *Molecular mechanisms* ***underlying nutrient detection + by incretin-secreting cells*** (two modifiers realized by combination: present participle clause + prepositional group)

(55). *Development* ***of allergic responses*** + ***related to microorganisms exposure + in early life*** (three modifiers realized by prepositional group + past participle clause + prepositional group)

CHAPTER 5: CONCLUSIONS IMPLICATIONS

In this work, I analyzed a corpus of titles of research and review articles belonging to Animal Production, a sub discipline of Veterinary Medicine, and taken from prestigious international journals. This analysis was made in terms of certain structural aspects, namely length, frequency rankings, lexical density, structures, heads and head modification. In the light of these aspects, I revealed certain pragmatic functions underlying the writers' options for some structural aspects over others. These findings presented some cross-generic differences as well as discipline specific features, which would agree with the writers' selections that best suit their successful interaction with the target readers.

Taken together, my findings show features worth highlighting. The noun phrase permeates my corpus: Noun Phrase is the most frequent title structure of RAs; noun phrase + noun phrase is the most frequent structure of Compound Construction, which at the same time is the most frequent title structure of RVAs and the second most frequent structure of RAs; preposition + noun phrase (prepositional phrase) is the most frequent structure of post modification in uni head Noun Phrase titles.

Length, title structure, and type of head present generic peculiarities. In terms of length, RA titles are longer than RVA titles, which could be understood in the light of the very nature and purpose of each genre.

As to title structures, Noun Phrase is the most frequent of RA titles and proved to be a flexible structure by allowing for the expression of most types of head as well as expanding lexically by way of different types of modification, the structure preposition + noun phrase being the most frequent. In this way, it becomes the most practical way of piling up information about the different variables and other aspects of the study. On the other hand, Compound Construction is the most frequent structure of RVA titles, being noun phrase + noun phrase the most frequent compound construction structure. This preference is understood in the light of the most frequent type of head for this genre in particular (see paragraph below).

As regards types of heads, RA titles feature "general classifying words that describe the results" as the most frequent head type, and "general classifying words that describe the action taken" in the second place. RVA titles, on the other hand, feature

"nouns denoting or implying genre" as the most frequent head type, displacing "general classifying words that describe the results" and "general classifying words that describe the action taken" to second and third positions respectively. It would appear that titles in Animal Production tend to point to the results in both genres, this aspect being displaced in the case of RVAs by the inclusion of the genre of the article in question, which becomes practical information for the scientist reader in his or her bibliographic search.

Number of heads and post modification number and structure present common features in both genres. One head titles are the most frequent over two, three, and four head titles; in fact, the higher the number of heads, the lower the frequency of occurrence. Post modification features two and three post modifiers as the most frequent number, and prepositional group as the most frequent structure, with *of* as the most frequent word in both genres, followed by *in* in both cases, which is understood in the light of the discussion and conclusions expressed on the use of nominalization and prepositional phrases.

In all, both structural and pragmatic features point to titles that effectively inform readers about the nature of the study. Thus, titles in Animal Production are informative and precise and, consequently, of easy indexation, avoiding creative stylistic features such as vagueness, alliterations, metaphors and allusions, which would translate into imprecision and ambiguity for the sake of hooking the target reader's attention, which seems to be the case of titles of other disciplines, more related to the Social and Humanistic sciences, as shown in other works described in this study.

In the light of the findings of the present work, I expect to contribute results that may offer insights useful to junior researchers for successfully fitting their target discourse community through the efficient decoding of such key genres as well as their publication of their findings.

More specifically, this work has a strong pedagogic intention: to learn about the nature of a portion of the language of science (that of Animal Production) so as to inform the teaching of EAP through models of resources used by experienced internationally published researchers when writing titles, in ways accessible to teaching staff, so that these language instructors may be able to make the scientific language of

Animal Production more apparent, accessible and available to the junior EFL researchers of the field.

Specifically, and in agreement with Soler (2007), the inclusion of title writing in the syllabus of scientific writing workshops and courses should be considered, with attention to different aspects as the ones analyzed in this study, namely title length, lexical density, structures, headwords, and how their occurrence realize different pragmatic functions, as well as how this correlation may best reflect the features of a well-written title: precision over ambiguity, informativity over vagueness, easy indexation over incorrect or difficult indexation. In view of these pedagogical intentions, we can see that more research is needed that describe the discourse conventions in specific fields, and whose results can serve as reliable basis upon which to design appropriate scientific title writing syllabuses.

Ultimately, this thesis aims to make contributions to the field of EAP as well as to corpus-based research.

APPENDIX A. Journals (2008-2011). Source of both research articles and review articles with Impact Factor figures between 2008 and 2011

JOURNALS	IMPACT FACTOR			
	2008	2009	2010	2011
1. AGRICULTURAL SYSTEMS	1.708	2.11	2.907	2.899
2. AGRICULTURE, ECOSYSTEMS AND ENVIRONMENT	2.884	3.13	2.79	3.004
3. EUROPEAN JOURNAL OF AGRONOMY	2.376	2.419	2.455	2.477
4. ANIMAL FEED SCIENCE AND TECHNOLOGY	1.882	1.886	1.72	1.691
5. ANIMAL REPRODUCTION SCIENCE	1.89	1.563	1.721	1.75
6. CANADIAN JOURNAL OF ANIMAL SCIENCE	0.659	0.66	0.927	0.77
7. AUSTRALIAN JOURNAL OF AGRICULTURAL RESEARCH 8. (until 2008)	1.132	1.304	1.328	-
8. CROP AND PASTURE SCIENCE (Australian Journal of Agricultural Research till 2009)	-	-	-	1.418
9. GRASS AND FORAGE SCIENCE	1.378	1.316	1.108	1.099
10. INTERNATIONAL DAIRY JOURNAL	2.421	2.409	2.181	2.401
11. JOURNAL OF ANIMAL SCIENCE	2.123	2.466	2.58	2.096
12. JOURNAL OF DAIRY SCIENCE	2.486	2.463	2.497	2.564
13. LIVESTOCK SCIENCE	1.091	1.41	`1.295	1.555
14. MEAT SCIENCE	2.183	1.954	2.619	2.275
15. NEW ZEALAND JOURNAL OF AGRICULTURAL RESEARCH	0.318	0.515	0.67	0.853
16. RANGELAND ECOLOGY & MANAGEMENT	1.107	0.921	1.438	1.461

Source: http://www.scijournal.org/

APPENDIX B: Categories for analysis

Category 1: Structure

1. Noun Phrase
2. Sentence (subdivision described below)
3. Compound Construction
4. Others

Category 2: Headword

1. general classifying words that describe the action taken (nouns)
2. general classifying words that describe the results (nouns or verbs)
3. verbal nouns describing a particular process
4. nouns describing property

5. nouns describing object of study
6. nouns denoting or implying genre

Category 3: Structure: Noun group: number of heads

1. one head
2. two heads
3. three heads
4. four heads

Category 4: Structure: Noun Group: Uni head and multi head

1. Uni head
2. Multi head

Category 5: Structure: Noun Group: Modification

1. head with pre modification only
2. head with post modification only
3. head with pre and post modification

Category 6: Structure: Noun Group (uni-heads only): Pre modification Number of Qualifiers

1. one pre modifier
2. two pre modifiers
3. three pre modifiers
4. four pre modifiers

Category 7: Structure: Noun Group (uni-heads only): Post modification Number of Qualifiers

1. one post modifier
2. two post modifiers
3. three post modifiers
4. four post modifiers
5. five post modifiers

Category 8: Structure: Noun Group (uni-heads only): Post modification Structure

1. Prepositional Group
2. Past Participle Clause

3. To-infinitive Clause
4. Present Participle Clause
5. Noun Phrase
6. Other (case 334 that-Clause)
7. Combination (of any of the above)

Category 9: Structure: Sentence

1. Statement
2. Question

Category 10: Structure: Compound Construction

1. noun group + noun group
2. noun group + question
3. noun group + statement
4. others

Category 11: Structure: Compound Construction: Relationship between parts:

1. General: Specific
2. Topic: Method
3. Problem: Solution
4. Major: Minor
5. Genre: Topic
6. Other

Category 12: Length

1. below 10 words
2. between 10 and 19 words
3. between 20 and 25 words
4. above 25 words

APPENDIX C. RA: Basic quantitative data on title length per journal and total: mean, range, mode.

RA title length **20 titles per journal, 75 per year, period 2008-2011**	**no. of words**	**mean (words per title)**	**range (lowest and highest no. of words per title)**	**mode (highest occurrence of no. of words per title)**
1. Agricultural Systems	298	14.9	10-21	14
2. Agriculture, Ecosystems and Environment	298	14.9	9-21	14
3. European Journal of Agronomy	325	16.25	6-32	20
4. Animal Feed Science and Technology	362	18.1	12-31	14,17, 20
5. Animal Reproduction Science	291	14.55	5-24	14
6. Canadian Journal of Animal Science	291	14.55	9-37	10
7. Australian Journal of Agricultural Research (until 2008) Crop and Pasture Science (2009 on)	75 293	15 19.53	12-18 15-29	18,17,16,15,12 17 y 15
8. Grass and Forage Science	333	16.65	7-27	13
9. International Dairy Journal	268	13.4	6-23	10, 14,19
10. Journal of Animal Science	356	17.8	6-40	16
11. Journal of Dairy Science	325	15.85	8-28	16
12. Livestock Science	337	16.85	10-28	19
13. Meat Science	318	15.9	7-22	20
14. New Z. Journal of Agricultural Research	308	15.4	8-28	13,15,16
15. Range and Ecology Management	253	12.65	8-19	11
TOTAL: 300 titles	**4731**	**15.77**	**5-40**	**14**

APPENDIX D. RVA: Basic quantitative data on title length per journal and total: mean, range, mode.

RVA title length **Uneven no. of titles per journal and year** **(see each case below), period 2008-2011**	**no. of words**	**mean (words per title)**	**range (lowest and highest no. of words per title)**	**mode (highest occurrence of no. of words per title)**
1. Agricultural Systems (5 titles)	96	19.2	13-25	-
2. Agriculture, Ecosystems and Environment	-	-	-	-
3. European Journal of Agronomy (5 titles)	60	12	8-15	15
4. Animal Feed Science and Technology (15 titles)	196	13.13	7-23	-
5. Animal Reproduction Science (22 titles)	288	13.09	4-29	14
6. Canadian Journal of Animal Science (3 titles)	32	10.66	9-14	9
7. Australian Journal of Agricultural Research until 2008 Crop and Pasture Science (2009 on)	-	-	-	-
8. Grass and Forage Science (3 titles)	56	18.66	14-18	-
9. International Dairy Journal (44 titles)	467	10.61	3-21	9
10. Journal of Animal Science (22 titles)	287	13.04	6-20	13, 18
11. Journal of Dairy Science (35 titles)	441	12.6	9-27	10
12. Livestock Science (18 titles)	253	14.05	8-26	9,10,14,19
13. Meat Science	-	-	-	-
14. New Z. Journal of Agricultural Research (5 titles)	45	9	5-15	-
15. Range and Ecology Management (3 titles)	40	13.33	9-19	-
TOTAL: 180 articles	**2261**	**13.26**	**3-29**	**9**

APPENDIX E. Examples of 14-word titles, the most frequent length of RA

The effect of agri-environment schemes on grey partridges at the farm level in England

Effect of feeding Saccharomyces Cerevisiae on performance of dairy cows during summer heat stress

The behavior of early-weaned piglets following transport: Effect of season and weaning weight

Shrub effects on herbs and grasses in semi-natural grasslands: positive, negative or neutral relationships?

APPENDIX F. Examples of 9-word titles, the most frequent length of RVA.

Invited review: A commentary on predictive cheese yield formulas

How the gut sends signals in response to food

Dairy product consumption and the risk of prostate cancer

Copper and lipid metabolism in beef cattle: a review

APPENDIX G. Lexical Density expressed in terms of lexical/structure word content per title expressed in number of words and percentage

Content: Structure Word Content (in no. & %) per journal	**RAs**		**RVAs**	
	No.	**%**	**No.**	**%**
1. Agricultural Systems 130 – 28	214:84	71.81: 28.18	62:34	64.58:35.41
2. Agriculture, Ecosystems and Environment 127 -	212:85	71.47: 28.52	-	-
3. European Journal of Agronomy 143 - 26	234:91	72: 28	44:18	73.33:30
4. Animal Feed Science and Technology160 - 71	261:101	72: 27.90	134:63	68.02:31.97
5. Animal Reproduction Science 123 - 91	207:84	71.13: 28.86	190:99	66.43:34.25
6. Canadian Journal of Animal Science 125 - 10	208:83	71.47:28.52	21:11	65.62:34.37
7.Australian Journal of Agricultural Research (until 2008) Crop and Pasture Science (2009 on) 32,137	55:23 215:78	73.23:30.66 73.37:26.62	-	-
8. Grass and Forage Science 145 - 28	239:94	71.77:28.22	42:14	75:25
9. International Dairy Journal 122 - 217	195:73	72.76: 27.23	330:144	69.62:30.37
10. Journal of Animal Science 168 - 138	262:94	73.59:26.40	220:82	72.84:27:15
11. Journal of Dairy Science 161 - 223	243:82	74.76: 25.23	336:113	74.83:25.16
12. Livestock Science 143 - 95	240:97	71.21: 28.78	176:81	68.48:31.51
13. Meat Science 152 -	235:83	73.89: 26.10	-	-
14. New Z. Journal of Agricultural Research 126 -25	217:91	70.45: 29.54	35:10	77.77:22.22
15. Range and Ecology Management 119 - 16	186:67	73.51: 26.48	28:12	70:30
TOTAL	**3423:1310**	**72.35 / 27.68**	**1628:681**	**70.87:29.64**

APPENDIX H. RA: Examples of highly dense Noun Phrase titles:

Hairy vetch (Viciavillosa Roth.) cover crop residue management for improving weed control and yield in no-tillage tomato (Lycopersiconesculentum Mill.) production

Use of normalised difference vegetation index, nitrogen concentration, and total nitrogen content of whole maize plant and plant fractions to estimate yield and nutritive value of hybrid forage maize

Evaluation of RothC model using four Long Term Fertilizer Experiments in black soils, India

Effects of dietary forage particle size and concentrate level on fermentation profile, in vitro degradation characteristics and concentration of liquid- or solid-associated bacterial mass in the rumen of dairy cows

Effects of live weight gain during pregnancy of 15-month-old Angus heifers on dystocia and birth weight, body dimensions, estimated milk intake and weaning weight of the calves

APPENDIX I. RA: Title structures per journal. Raw numbers and percentages

RA title structures	**Noun Phrases**		**Compound**		**Sentence: Statements**		**Sentence: Questions**	
Journals:20 titles per journal, 75 per year, period 2008-2011	**no.**	**%**	**no.**	**%**	**no.**	**%**	**no.**	**%**
1. Agricultural Systems	14	70	6	30	-	-	-	-
2. Agriculture, Ecosystems and Environment	17	85	2	10	1	5	-	-
3. European Journal of Agronomy	14	70	4	20	1	5	1	5
4. Animal Feed Science and Technology	19	95	1	5	-	-	-	-
5. Animal Reproduction Science	15	75	2	10	3	15	-	-
6. Canadian Journal of Animal Science	10	50	4	20	5	25	1	5
7.Australian Journal of Agricultural Research (until 2008) - Crop and Pasture Science (2009 on)	14	70	3	15	3	15	-	-
8. Grass and Forage Science	14	70	5	25	1	5	-	-
9. International Dairy Journal	16	80	3	15	1	5	-	-
10. Journal of Animal Science	14	70	1	5	5	25	-	-
11. Journal of Dairy Science	18	90	-	-	2	10	-	-
12. Livestock Science	18	90	1	5	1	5	-	-
13. Meat Science	16	80	2	10	1	5	1	5

14. New Z. Journal of Agricultural Research	16	80	-	-	2	10	1	5
15. Range and Ecology Management	6	30	9	45	2	10	3	15
TOTAL: 300	**221**	**74**	**43**	**14.33**	**28**	**9.33**	**7**	**2.33**

APPENDIX J. RVA: Title structures per journal. Raw numbers and percentages

RVA title structure	**Noun Phrases**		**Compound**		**Sentence: Statements**		**Sentence: Questions**	
Journals: uneven no. of titles per journal and year (see each case below), period 2008-2011	**no.**	**%**	**no.**	**%**	**no.**	**%**	**no.**	**%**
1. Agricultural Systems (5 titles)	2	40	3	60	-	-	-	-
2. Agriculture, Ecosystems and Environment	-		-	-	-	-	-	-
European Journal of Agronomy (5 titles)	2	40	3	60	-	-	-	-
4. Animal Feed Science and Technology (15 titles)	5	33.33	9	60	-	-	1	6.6
Animal Reproduction Science (22 titles)	12	54.54	10	45.45	-	-	-	-
Canadian Journal of Animal Science (3 titles)	-		3	100	-	-	-	-
7.Australian Journal of Agricultural Research (until 2008) Crop and Pasture Science (2009 on)	-	-	-	-	-	-	-	-
8. Grass and Forage Science (3 titles)	-	-	3	100	-	-	-	-
9. International Dairy Journal (44 titles)	21	47.72	21	47.72	1	2.27	1	2.27
10. Journal of Animal Science (22 titles)	2	9.09	21	95.45	-	-	-	-
11. Journal of Dairy Science (35 titles)	-		35	100	-	-	-	-
12. Livestock Science (18 titles)	6	33.37	12	66.66	-	-	-	-
13. Meat Science	-	-	-	-	-	-	-	-
14. New Z. Journal of Agricultural Research (5 titles)	1	20	3	60	-	-	-	-
15. Rangeland Ecology Management (3 titles)	-	-	3	-	-	-	-	-
TOTAL: 180 titles	**51**	**28.33**	**126**	**70**	**1**	**0.55**	**2**	**1.11**

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